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ABSTRACT

This final report documents achievements of a project to assess social impact and achievement gains resulting from the use of interactive videodisc technology to teach fractions in mainstreamed classrooms across multicultural settings. Subjects (N=294) were regular upper elementary students and students with mild handicaps (MH) in Utah, Wyoming, and New Mexico. The study examined the effects of the videodisc-based math program on: (1) attitudes of regular teachers and student peers toward mainstreamed students with MH; (2) the self-esteem of the MH students; (3) the frequency of academic (as opposed to behavior management) interactions between teachers and MH students; and (4) achievement in basic fractions concepts. Findings indicated that teachers in both years of the study maintained their opinions about mainstreaming; MH students experienced greater teacher interactions; the MH students showed large achievement gains (both in fraction concepts and generalized achievement testing) and increased self-esteem; peer attitudes toward MH students, however, declined significantly during the study. Appendices include measures and scoring procedures, data details, and a dissertation abstract. Includes 39 references. (DB)

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ll grantees are required to complete Part I of the Performance Report.

te of Report: September 5, 1991	Grant Number: 6008730285-88	Period of Report: From: 10/1/1987 To: 12/31/89

antee Name and Descriptive Title of Project:

Utah State University
Assessing Social and Cross-cultural Impact of Group-based Videodisc Technology

ERTIFICATION: I certify that to the best of my knowledge and belief this eport (consisting of this and subsequent pages and attachments) is rrect and complete in all respects, except as may be specifically noted rein.

yped Name of Project Director(s) or Principal vestigator(s): Ron Thorkildsen	Signature of Project Director(s) or Principal Investigator(s): Ron Thorkildsen

PART II - PROJECT SUMMARY

All grantees are required to complete Part II of the Performance Report.

l grantees are to compare (in a narrative format) actual accomplishments er the grant award period to objectives contained in the originally pproved grant application and, when appropriate, subsequently approved ontinuation applications. In addition to discussing project/program complishments and milestones, grantees should discuss slippages in tainment of program objectives and target dates and reasons for slipp-ges where any differences occurred between originally stated objectives d the actual outcome of activities. This includes any failure to carry t all funded activities. When the output of the grant can be readily uantified, such data should be included -- and related to cost data for e computation of unit costs. When appropriate, utilize quantitative ojections, data collected, criteria, and methodologies used to evaluate oject/program accomplishments. Discuss reports made by or to pro-essional journals, other publications, and professional conferences.

rantees are also encouraged to highlight those phases, strategies, or roducts of their project/program which proved most successful.

rther monies may be withheld under these programs unless this report is mpleted and filed according to existing law and regulations (34 CFR Part 300).

D Form 9037-1, 2/84

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INTRODUCTION

In this final progress report we first present the project purpose and need for the project. We then present the proposed objectives and any deviations from these objectives, followed by the research methods we used, the results of the research and a discussion of the findings.

Project Purpose

The purpose of the proposed project was to assess social impact and achievement gains resulting from the use of interactive videodisc technology to teach fractions in mainstreamed classrooms across multicultural settings. Subjects were regular students and students with mild handicaps (MH)[*]. Research was conducted in Utah, Wyoming, and New Mexico to determine if the videodisc-based math program (treatment) results in significant[**] differences between treatment and control groups on the following variables: 1) attitudes of regular teachers and student peers toward mainstreamed students with MH, 2) the self esteem of students with MH, 3) the frequency of academic (as opposed to behavior management) interactions between regular teachers and mainstreamed students with MH, and 4) achievement in basic fractions concepts by students with MH as measured by both standardized and criterion referenced test scores.

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[*] Students with Mild Handicaps (MH) refers to students who have been classified as Learning Disabled (LD) or mildly Intellectually Handicapped (IH). These students typically receive special education services in resource rooms and spend part of the school day in mainstreamed classrooms.

[**] Throughout this report, significance refers to both statistical and educational significance.

Need for Project

This section describes the need for the project based upon the literature extant at the beginning of the project. Finding instructional methods which will assist regular teachers to teach mainstreamed children with MH remains a problem.

National Trends

The relationship between regular education and special education is currently of great concern. In a recent report to the U.S. Secretary of Education, Madeleine Will (1986) recommended finding effective ways of educating mildly handicapped students in regular classrooms and increasing the involvement of regular educators in the education of these students. In concert with Will, Reynolds, Wang and Walberg (1987) recommended that special educators join with regular educators to develop a broad program of adaptive education appropriate for all students including those with mild handicaps. Further, Stainback and Stainback (1984) asserted that categorizing students as regular and special is not an effective practice because it deprives some students of needed special help, legitimizes the exclusion of students with mild handicaps from regular education, and unnecessarily stigmatizes special education students.

The February, 1987 issue of the journal, Exceptional Children, is devoted entirely to analyzing the recent series of national reports on the state of education and the implications of these reports for special education. These analyses have a common theme: major changes are required in the way we educate students with mild handicaps including the proposal that regular educators take a greater role in their education. These reports, continue to support the idea of placing students with mild handicaps in the least restrictive environment. For students with mild handicaps, the least restrictive environment is still considered the regular mainstreamed classroom.

The least restrictive environment has been characterized by Huron and Skinner (1981) as a place where: 1) the handicapped student's opportunities to respond and achieve are maximized, 2) the classroom teacher can give roughly an equal amount of attention to each student in the classroom, and 3) acceptable social relations between handicapped and nonhandicapped students are fostered. There is evidence, however, that many mainstreamed classrooms do not provide these conditions (Bryan, 1972; Chapman, 1974; Fink, 1977; Kaufman, Gard & Semmel, 1985; Larrivee, 1985; Wherry & Quay, 1969).

The pertinent conclusion to be drawn from the cited literature is that while mainstreaming constitutes the best option for educating students with mild handicaps, certain characteristics of the mainstreamed classroom environment severely limit its effectiveness. Alteration of some of those characteristics was the focus of this project.

The Regular Classroom and Mainstreaming

Two factors that greatly influence the instructional climate of the mainstreamed regular classroom are teacher and student attitudes toward mainstreamed students, and teacher/student interactions (Kaufman, Agard and Semmel, 1985). Low achievement may strongly influence these factors, and these factors in turn may affect the self esteem of students with MH (Meisel, J.C. 1986).

Teacher Attitudes

Mainstreaming frequently demands that teachers work with children who are time-consuming and difficult to manage. As a result, teachers may develop negative attitudes toward mainstreamed students. For example, teachers often view the integration of handicapped students in their classrooms as extra work for which they receive no compensation (Guetzloe & Cline, 1983; Larrivee, 1982; Reynolds, Martin-Reynold, & Mark, 1982). A major study on mainstreaming conducted by Kaufman, Agard and Semmel (1985) indicated that approximately half of the regular teachers stated that handicapped students disrupted the classroom and did not participate in group activities. The teachers also said that integrating these students into the regular classroom required too much teacher time and unavailable materials. Silvia and Munson (1986) conclude that regular classroom teachers feel that they do not have the training to deal with students with handicaps, and that they are reluctant to mainstream students for whom they must alter basic instruction.

Student Attitudes

Eposito and Reed II (1986) reviewed the literature on contact between handicapped and nonhandicapped students and resulting attitudes, concluding that the findings were equivocal and that additional research was required. It is generally accepted, however, that the attitudes of nonhandicapped students toward students with mild handicaps may be a barrier to effective mainstreaming. Siperstein and Bak (1986) report from their studies that the appearance and social behavior of students with intellectual handicaps affect student attitudes, but that nonhandicapped children's attitudes are most negative toward a peer who exhibits incompetent academic behavior.

Teacher/Student Interactions

Interactions between classroom teachers and mildly handicapped children often differ quantitatively and qualitatively from those occurring between classroom teachers and nonhandicapped children. Teacher's interactions with handicapped children are likely to be more frequent, nonacademic, and negative (Thompson, White & Morgan, 1982). In that study, teachers in mainstreamed classrooms spent 60 to 90 percent more nonacademic (procedural and managerial) time with mainstreamed handicapped students than with nonhandicapped students. The high frequency of nonacademic interactions between teachers and handicapped students may have a deleterious affect on the way other students perceive their handicapped peers and may negatively influence the achievement of the handicapped student.

Research Problem

An assessment of current policy trends reveals a concerted and intense effort to involve regular educators more in the education of mildly handicapped students and to continue to encourage the use of mainstreamed classrooms. Regular and special educators, however, have serious concerns about the affect of mainstreaming on the academic and social growth of students with mild handicaps. As previously noted, regular classroom teachers are unable or unwilling to alter their basic instruction, nonhandicapped students' attitudes are negatively affected by incompetent academic behavior, and teacher/student interactions tend to be non-academic and negative. Consequently, it seemed crucial to develop or identify instructional programs which provide effective instruction for all students in mainstreamed classrooms while promoting academic interactions between teachers and mainstreamed students with mild handicaps.

Correspondingly, research was necessary to determine the social and academic impact of these programs on mildly handicapped students.

Proposed Solution

The following section outlines the solution we proposed to help solve the research problem. The project was guided by this solution and the resulting procedural objectives.

Research on effective teaching and concept development provides useful guidelines for developing effective instructional materials. Combining this instructional design knowledge with the presentation power of a laser videodisc provides teachers an instructional system with high potential for fostering learning among students with a wide range of abilities (Hofmeister, Engelmann & Carnine, 1986). A videodisc program, Mastering Fractions (Systems Impact, Inc., 1985), recently developed and designed according to effective teaching and concept development principles appears to be particularly promising.

Experimental research has shown Mastering Fractions to be effective in terms of instruction and cost with groups of regular fifth graders, remedial math eighth graders, advanced fourth graders (Hofmeister, Engelmann & Carnine, 1986), and with fifth grade resource room student, and with self-contained behaviorally disordered students (Green and Thorkildsen, 1986). Mastering Fractions appears to meet all the contingencies required for effectively teaching students with mild handicaps in a mainstreamed classroom. The Mastering Fractions program and its development according to effective teaching and concept development principles is fully described in the Technical Methods Section.

We anticipated that implementation of the Mastering Fractions program would effectively teach the basic concepts of fractions to both mildly handicapped and nonhandicapped students. Because the program requires both teachers and students to be actively involved in the instruction, we predicted that the increased achievement would be accompanied by an increase in positive, academic teacher/student interactions and a decrease in negative management interactions between teachers and mildly handicapped students. Correspondingly, we predicted that teacher and student attitudes toward mildly handicapped students would improve as the students demonstrate increased achievement and positive interactions. We did not expect that there would be dramatic changes in either teacher or student attitudes. Attitudes are not easily changed and attitude changes tend to be temporary (Gresham, 1986; Siperstein and Bak, 1986). Any positive changes, even small changes, resulting from this project would be considered important because the treatment could be a viable part of a regular classroom curriculum.

Procedural Objectives

The following are the major procedural objectives we proposed to accomplish during the two years of the project:

1. Train observers to 90 percent interrater agreement.
2. Select subjects.
3. Administer attitude, self esteem, and achievement pretests.
4. Implement treatment and observations.
5. Administer attitude, self esteem, and achievement posttests.
6. Administer attitude, self esteem, and achievement follow-up tests.
7. Analyze data.
8. Disseminate project findings by publishing in professional journals and presenting at professional conferences.

Procedural objectives 1 through 7 were repeated for each of the two years.

Procedural Objectives Attained

This section describes how each procedural objective was attained for each of the two years. The product of attaining these objectives is the research. The research was guided by the research design and the research questions which are presented in the Technical Methods Section of this report. The results of the research is presented in the Results and Conclusion Section and discussed in the Discussion Section.

Objective 1. Train observers to 90 percent interrater agreement.

Two videotapes were produced for training. One videotape depicted normal classroom interactions between the teacher and students with the Mastering Fractions program in the classroom, and the second videotape depicted normal classroom interactions without the presence of the videodisc program. The videotapes were used to train observers from both the Logan and Ogden sites to an interrater agreement of 90%. Training was conducted in October of 1987 for the first year and in October 1988 for the second year.

The observation form used for training and for the actual classroom observations was modified slightly from the form that was proposed. The revised form is contained in Appendix A.

The following formula was used to calculate percentage agreement according to the following formula (see Coulter, 1976, p. 19):

$$\text{Percentage Agreement} = \frac{\text{Agreements between Observer A and Observer B}}{\text{Agreements for A and B + Disagreements for A and B + Omissions for A + Omissions for B}}$$

During the first year, interrater agreement was checked at least 20 times during the course of the observations. This check was accomplished by having two observers observe the same classroom and independently rate the teacher/student interactions. These pairs of observations were then checked for agreement on Type of interaction and Quality of interaction. The agreement coefficient on Type of interaction over 20 observation checks was .88. The agreement coefficient quality of interactions over 20 checks was .97.

During the second year, reliability checks were made, however, the analysis of these reliability data could not be found at the writing of this report. Rather than delay the report, a spot check of six observations reveals a range of .62 to .92 with an average of .73. These data will be reanalyzed for subsequent reporting.

Objective 2. **Select subjects.**

During year 1, the project was implemented in two fieldtest sites: Logan, Utah and Ogden, Utah.

Logan, Utah. Logan is a Northern Utah town of about 50,000 people. There are two large school districts. The large majority of students are Caucasian and of medium SES. A majority of the students belong to the "Mormon" religion. The population of Logan is considered suburban.

Ogden, Utah. Ogden is a Northern Utah city of approximately 200,000 persons. There are a relatively large number of minority students in the Ogden School District. The Ogden School District is considered an urban district with medium to low SES students.

The curriculum directors and special education directors of both school districts were contacted and informed of the project. These directors then set up meeting for project staff to explain the project to principals and teachers. These meetings resulted in six regular education teachers and three special education teachers from the Logan district; and six regular education teachers and three special education teachers from the Ogden district.

The six classrooms in each district were randomly assigned to either a treatment or control group. However, in the Ogden District two classes required switching groups because students in the classroom originally assigned to the treatment group did not have prerequisites for the fractions instruction.

In both districts students are randomly assigned to classes. All students in all classrooms were involved in the instruction. All students were tested but only selected students were used in the data analysis. Students were categorized as High Achieving, Low Achieving (non-special education) or Low Achieving (Mildly Handicapped). Categorization was based on scores on the math subtest of a standard achievement test and Special Education classification. High achievers were approximately 1 standard deviation (SD) above the mean and low achievers 1 SD below. Mildly Handicapped (MH) students included all students who were officially receiving special education services. Table 1 shows the number of students in each district for each achievement classification.

Table 1. Year 1 Students for Each Achievement Classification by District

School District	Treatment Group	Achievement Classification	Number Students
Ogden	Treatment	High	12
		Low	11
		Low-MH	4
	Control	High	11
		Low	9
		Low-MH	3
Logan	Treatment	High	8
		Low	12
		Low-MH	8
	Control	high	7
		Low	7
		Low-MH	8
Total			100

The selection procedures for year 2 were essentially the same as for year 1. In year 2 students were involved from three districts: Ogden, Ut; Cody, WY and Las Cruces, NM.

Cody, Wyoming. Cody is a mountain town in Northwestern Wyoming, boarding Yellowstone National Park. The school district encompasses a number of small towns containing schools with as few as 100 students. The population of these towns is rural and of low to medium SES.

Las Cruces, New Mexico. Field testing will be conducted in both Las Cruces and nearby Gadsen School Districts. Law Cruces' student population is 60% Hispanic and Gadsen's is over 90%. Spanish is the primary language of over 50% of these students and Spanish is typically the predominant language spoken in the homes of these students.

Cultural differences are being investigated in two of the four geographic locations: Ogden, Utah and Las Cruces, New Mexico. The Ogden School District has a relatively large number of minority students. Approximately 14% are Hispanic. The Las Cruces field test will involve two school districts. The Las Cruces District has 60% Hispanic students and the Gadsen District has 90% Hispanic students. Approximately 50% of the New Mexico students have Spanish as their primary language. Hispanic students in the Ogden District primarily speak English. This language difference between the Utah and New Mexico students will provide information about culturally different students with and without language differences.

As with the first year, students were classified as high achievers, low achievers and low achievers with mild handicaps. During the second year, students in Chapter 1 were included in the low achieving-MH classification. Table 2 shows numbers of students for each district by achievement classification.

Table 2. Year 2 Students for Each District by Achievement Classification

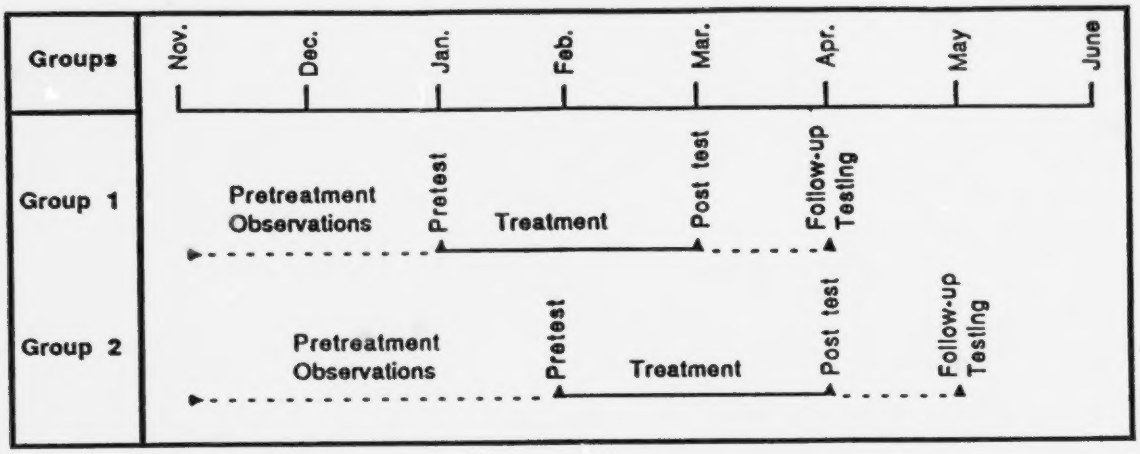
School District	Treatment Group	Achievement Classification	Number Students
Ogden	Treatment	High	7
		Low	8
		Low-MH	8
	Control	High	7
		Low	7
		Low-MH	7
Cody	Treatment	High	8
		Low	8
		Low-MH	27
	Control	High	18
		Low	10
		Low-MH	6
Las Cruces	Treatment	High	19
		Low	17
		Low-MH	1
	Control	high	1
		Low	24
		Low-MH	11
Total			194

Note that there was only 1 high achieving student in the Las Cruces control group. This resulted from two fourth grade classes being included. The fourth graders were not ready for fractions until the Spring study.

Objectives 3, 4, 5 and 6.

These four objectives deal with implementation of the treatment (mastering fractions) and administering pre and posttests. Because these objectives are so closely related, they are reported together. The criteria for judging the attainment of these objectives are the research results which are found in a later section of this report.

The general schedule for implementation and scheduling is found in Figure 1.


Groups
Nov.
Dec.
Jan.
Feb.
Mar.
Apr.
May
June
Group 1
Pretreatment Observations
Pretest
Treatment
Post test
Follow-up Testing
Group 2
Pretreatment Observations
Pretest
Treatment
Post test
Follow-up Testing

The schedule presented in Figure 1 was used in both years. The instruments are described in the Technical Methods Section and copies of the instruments (excluding standardized tests) are contained in Appendix A. The program was implemented during the Spring of each year primarily so that the control group students could receive the instruction; however, we collected data because the Spring studies provide systematic replications. Since there was no control groups during the Spring studies, the Spring data are not considered part of the main study. Analysis of the Spring data is contained in Appendix B.

Follow-up testing was conducted with students in the treatment groups for both years. Control group comparisons were not made because the control group students were involved in the treatment during the follow-up testing (see Figure 1.). The follow-up mean scores and posttest to follow-up test effect sizes are contained in Appendix C. Observations of teacher feedback were not made beyond the posttest, and therefore, are not included in Appendix C.

Objective 7. Analyze data.

The research design, research questions and data analysis procedures are presented in the Technical Methods Section of this report. Data analysis of different aspects of the projects were presented at different times during the project to prepare for the continuation proposal and to prepare for conference presentations. Data analysis for the entire project was conducted at the end of the project, the results of which are presented in the Results Section.

Objective 8. Disseminate project findings by publishing in professional journals and presenting at professional conferences.

Different aspects of the project were presented at the following national conferences:

1. Thorkildsen, R. (1988, April). Effective use of laser videodisc programs in special education. Paper presented at Wyoming State CEC, Riverton, WY.
2. Thorkildsen, R. (1988, March). Videodisc/microcomputer technology: Implications for the handicapped. Paper presented at Vistas of Instructional Technology, Billings, MT.
3. Thorkildsen, R. (1988, December). Special education technologies: Practical realities. Paper presented at CEC/TAM Conference on Special Education and Technology, Reno, NV.
4. Thorkildsen, R. (1989, January). Research on videodisc-based math instruction in mainstreamed classrooms. Paper presented at AECT National Conference, Dallas, TX.
5. Lowry, W., & Thorkildsen, R. (1990, April). The effect of a videodisc-based direct instruction program in fractions on mathematics achievement and self-concept. Paper presented at AERA National Conference, Boston.

6. Lowry, W., & Thorkildsen, R. (1991, January). The effect of implementation levels on achievement with a videodisc-based program in fractions. Paper published in proceedings, Association for Education Communication Technology Conference, Anaheim, CA.

7. Thorkildsen, R., & Lowry, W. (1991, April). Determining the differential effect on math achievement of levels of implementation of a videodisc-based program with regular and mildly handicapped students. Paper presented at the AERA Annual Meeting, Chicago, IL.

8. Lowry, W., & Thorkildsen, R. (1991, April). Implementation levels of a videodisc-based math program and achievement. Paper presented at AECT Conference, Orlando, FL. Paper distributed, published in proceedings.

A manuscript was submitted to Journal of Teacher Education but was not accepted because we used a quasi-experimental design. The manuscript is being revised for resubmission. The major findings from the project are being prepared for submission to a professional journal in special education.

TECHNICAL METHODS

Instructional System

In this section we describe the instructional program and methods used, the research questions, research design and data analysis procedures. The sample selection and instruments were described in the Procedural Objectives Attained Section.

Mastering Fractions Program

The Mastering Fractions program consists of 35, 40-minute lessons. Every fifth lesson is a mastery test covering materials from the previous lessons. If the program is used four days per week, it typically takes 12 weeks to complete, because some lessons may be repeated. All of the basic concepts in fractions are covered by the program.

The Mastering Fractions program is designed for group instruction, with videodisc audio and video instructional segments presented on a color TV monitor placed in front of the class. Presentations are controlled by the teacher with a hand-held remote control keypad. The teacher circulates among the students to check their work and provide individual assistance. The program begins with general instructions for students from the videodisc. These instructions, presented both orally and visually, describe how lessons will proceed and what is expected of students. Students are instructed to watch the screen and to listen for explanations, directions, and questions. When the program instructs them to work problems in their workbook or on lined paper, they are told that the teacher will check their written work and help them correct any errors. Graphic prompts are provided for both teachers and students throughout the programs.

The videodisc instruction for each lesson begins with a short, two-part quiz that reviews the previous lesson. When all students have completed the quiz, the teacher advances the videodisc to the next frame and correct answers are displayed on the screen, with a prompt for the teacher to check each student's answers. The teacher then advances another frame to display a decision screen containing criteria and instructions on how to proceed. If 20% or more of the students have answered either part of the quiz incorrectly, the teacher is instructed to play a remedial lesson located elsewhere on the disc. If 80% or more of the students have answered both parts of the quiz correctly, the teacher is directed to continue with the lesson. If a subgroup of students continue to have difficulty and are delaying the progress of the total group, small groups or individuals can use the system by themselves with minimal teacher assistance (Green and Thorkildsen, 1986). This method has resulted in effective remediation.

During a lesson, students are required to respond frequently both orally and in writing. Packing is brisk; i.e., only a brief pause occurs after each question in which students are expected to respond orally, and then the correct answer is presented visually and auditorially from the videodisc. When written responses are required, the program automatically stops on a still frame and can be held at that point for as long as necessary. Since the teacher is free to monitor individual student's responses, and the program can be paused at virtually any point, pacing can be modified easily to accommodate students who need more time to respond.

Skills or concepts are to be mastered before moving to the next skill. Every skill, once mastered, is reviewed in every following lesson. Conceptual understanding and problem-solving strategies as well as computational skills are stressed throughout the programs. Numerous examples of each concept are presented. Examples are shown in various pictorial representations that are synchronized with the audio explanation.

An Instructor's Manual accompanies each program and contains directions for using the program, suggestions for organizing the class for group instruction, and the scope and sequence of the program segments. Management techniques are suggested to help the teacher maximize engaged learning time and insure rapid progress through the program. The Instructor's manuals also describe procedures for diagnosing and correcting common errors.

Effective Teaching and Mastering Fractions

In recent reviews, Good, Biddle, & Brophy (1983); Brophy, & Good (1986); and Bickel, & Bickel (1986); have concluded that there is sufficient evidence from correlational and experimental studies to identify effective teaching strategies. Larrivee's (1985) study on effective mainstreaming resulted in the conclusion that teaching strategies that are effective in regular classrooms are also effective in mainstreamed classrooms. The 15 teaching strategies described by Larrivee correspond directly to the strategies described below and the relationship of these strategies to the Mastering Fractions program.

Engaged Learning Time

Student achievement is maximized when there is ample opportunity for learning and most of the available classroom time is devoted to instruction. Management techniques to maximize learning time include: establishing rules and procedures at the beginning of the year; packing lessons smoothly; providing variety and the appropriate degree of challenge in student assignments; holding students accountable for completing assigned work; making it clear how and when students can obtain help; and monitoring student attention continuously (Brophy, & Good 1986; Good, Biddle, & Brophy, 1983; and Good, Grouws, & Ebmeier, 1983).

Rules and procedures used in Mastering Fractions are explicit and consistently applied. The programs are designed to maintain student attention through smooth and rapid pacing, and the students and the teacher are actively involved during the videodisc instruction. Most of the time allocated for lessons is devoted to instruction rather than to procedure.

Group Instruction and Individual Work

Students learn more when most of their time is spent being taught or supervised by the teacher rather than working on their own (Brophy & Good, 1986; Good, Biddle, & Brophy, 1983). Good Grouws, and Ebmeier (1983) found that the most effective teachers used large group instruction most of the time. During whole class instruction, effective teachers present information frequently and develop concepts that are then elaborated in feedback to students. When independent work (seatwork or homework) is assigned, effective teachers provide instructions and examples to prepare students for the assignments, and hold students accountable for completing the work (Brophy & Good, 1986; Good, Biddle, & Brophy, 1983).

The Mastering Fractions program is well-suited to large group instruction. Mastering Fractions was field tested with classes of up to 28 students (Carnine, Engelmann, Hofmeister & Kelly, 1986). Lessons presented in all the Mastering Fractions videodisc programs emphasize concept development. Instructions and examples precede independent work assignments. Independent seatwork is to be monitored by the teacher, and homework that students do on their own is to be checked by the teacher the next day.

Success Rates and Feedback

Achievement is maximized when students move through a curriculum in small steps, and experience moderate to high rates of success. Students should be able to answer correctly questions directed to them at least 75 percent of the time, and should be able to perform independent work with 90-100 percent accuracy. Frequent feedback should be provided. Correct responses should be followed by simple affirmative feedback always, and more enthusiastic praise occasionally. Incorrect responses should be labeled as such, and the process for arriving at a correct answer should be explained. If necessary, the concept should be retaught (Brophy & Good, 1986; Good, Biddle, & Brophy, 1983).

Instruction in the Mastering Fractions programs is sequenced in small steps, insuring high rates of success. Feedback for in-class student responses occurs frequently and immediately. When 20% or more of the class has not mastered a lesson (as demonstrated by student performance on quizzes) the teacher is instructed to go immediately to a remedial lesson contained on the videodisc.

Repetition/Review

Effective instruction includes frequent repetition of general rules and key concepts. Objectives are reviewed at the beginning of each lesson, and the main ideas presented in the lesson are reviewed at the end. Students have ample opportunities for drill and practice focusing on concepts and principles rather than on rote memorization or mechanical skills. Remedial instruction and additional practice are provided until students have mastered skills (Brophy & Good, 1986; Good, Biddle, & Brophy, 1983; Good, Grows, & Ebmeier, 1983). As noted previously, the Mastering Fractions program incorporates frequent repetition, review, drill and practice, remediation and mastery learning.

Concept Development and Mastering Fractions

The Mastering Fractions program was developed using the principles of Direct Instruction as described by Englemann and Carnine (1982). In general, Direct Instruction is aimed at greatly reducing the number of extraneous variables in the teaching process and maintaining consistency in student-teacher interactions. Principles for sequencing examples and providing systematic communication have been developed, extensively field tested, and used in effective instructional programs such as DISTAR and Direct Instruction Math. In a review of the research on concept development, Van Patten, Chao, and Reigeluth (1986) concluded that the sequencing principles developed by Englemann and Carnine are very similar to the sequencing principles developed by other commonly accepted models such as the Component Display Theory (Merrill, 1983) and the Elaboration Theory (Reigeluth & Stein, 1983). Direct Instruction is generally considered an effective approach for teaching low achievers (Lewis & Doorlag, 1983).

Field Testing of Mastering Fractions

The Mastering Fractions program was field tested and revised five times during the formative evaluation. Experimental studies have been conducted at the University of Oregon and Vanderbilt University. In both cases the Mastering Fractions program was significantly superior in student achievement than comparable textbook instruction (Hofmeister, Englemann

& Carnine, 1986). Research, conducted by Utah State University staff resulted in significantly effective achievement with LD students in a resource room and BD students in a self-contained classroom (Green and Thorkildsen, 1986).

Research Questions and Dependent Measures

The research questions and dependent measurers are listed in Table 3. The observation and measurement methods are described below.

Observation Methods

Observation training was described in the previous section under Objective 1. During the first year, five observers, two for each group and one for observer reliability, were hired and trained to collect data related to teacher/student interactions. Observers were randomly assigned to classrooms.

During the second year, observers were hired at each site as follows: Ogden (2), Cody (4) and Las Cruces (4).

Interaction Measures

Observers observed each classroom three times a week for a 50 minutes period. Observers recorded all interactions between the teacher and all students in the classroom. Interactions were categorized as to type -- academic, behavioral or procedural, and quality -- positive, natural and negative. At the beginning of the year 1 treatment, the number of group responses were recorded (see observation instrument in Appendix A). It became obvious, however, that group responses corresponded directly to the response demands of the videodisc and could be calculated rather than observed directly.

Table 3. Research Questions and Dependent Measures

Research Questions	Dependent Measures
1. Are there significant differences between groups in teacher's attitudes toward mainstreamed handicapped students?	1. Mean scores on the Teacher Rating Scale.
2. Are there significant differences between groups in peer student attitudes toward mainstreamed handicapped students?	2. Mean scores rating and nomination scales.
3. Are there significant* differences between groups in the self-esteem of the students with MH.	3. Scores on the Piers-Harris self-esteem scale.
4. Are there significant differences between groups in the type of teacher feedback to students?	4. Frequency of teacher feedback. 5. Proportion of teacher feedback that is academic. 6. Proportion of teacher feedback that is procedural. 7. Proportion of teacher feedback that is behavioral.
5. Are there significant differences between groups in the quality of teacher feedback to students?	8. Quality of academic teacher feedback (i.e., positive, neutral, negative). 9. Quality of procedural teacher feedback (i.e., positive neutral, negative). 10. Quality of behavioral teacher feedback (i.e., positive, neutral, negative).
6. Are there significant differences in math achievement between the mainstreamed students and the three categories of regular education students?	11. Mean scores on the criterion test for fraction for each type of student. 12. Mean scores on the SAT math subtest for each type of student.

* Use of the term significant designates both practical and statistical significance. See section on practical and statistical significance.

Teacher Attitudes

Three of the four scales of the Teacher Rating Scale (Academic Effort/Success, Antisocial Behavior, and Outgoing/Expressive Behavior) were used to assess teacher attitude. The average internal consistency reliability estimate of the three scales is .95. This reliability estimate was calculated as part of project PRIME using students with MH as subjects (Kaufman, Agard & Semmell, 1985).

Student Attitudes

Sociometric measures were used to measure student attitude and to classify the students with MH as neglected or rejected. Asher and Hymel (1981) recommend using peer nominations to classify students as rejected or neglected and a peer rating--scale to measure overall peer acceptance. Reliability on nomination scales has been reported to range from .39 to .89 and on rating scales from .75 to .90 (McConnel and Odem, 1984).

The peer rating-scale measures the extent to which a group of students like to play with any one student in the group. A five point "play with" scale was used in which a rating of one corresponds to "like to play with least" and a rating of five corresponds to "like to play with most." In addition to the "play with" scale, other scales will be investigated using the adjective procedures developed by Siperstein and Bak (1986) to get an additional measure which is more sensitive to perceived changes in academic behavior.

Language Assessment Scales (LAS)

This normed test is used to assess language proficiency in English versus spanish. The testing results in categories of 1) all Spanish, 2) little English, 3) bilingual, 4) little Spanish, and

5) all English. The test is administered individually and requires about 20 minutes (Duncon, S. E. and DeAvila, E. A., 1986).

Self-Esteem

The Self-Description Questionnaire (SDQ) contains seven scales which have been empirically tested by Marsh and Salverson (1986). We used the math self-concept scale in this study to measure self-esteem. The Chronback Alpha reliability is estimated to be .89 and the test-retest reliability is estimated to be .88.

Criterion Test of Fraction Skills

A criterion-referenced test which assesses mastery of the concepts taught in the Mastering Fractions Program has been developed. The test-retest reliability of this test has been estimated to be .70. The test if currently being revised inn an attempt to improve the reliability. Additionally, concurrent validity will be estimated by comparing this test to the math subsection of the SAT. This will be administered at the beginning and end of each treatment and five months following the treatment.

Standardized Test of Math Skills

The grade appropriate math subtest of the Stanford Achievement Test (SAT), Iowa Test of Basic Skills (ITBS), and California Test of Basic Skills (CTBS) were administered to all students at the beginning of each off the two years. The standardized test pretest scores were used to categorize the regular students as low achieving and high achieving in math (see Objective 2, Subject Selection). The SAT were administered again at the end of each treatment. During the first year, both districts used the SAT. During the second year, Cody used the ITBS and Ogden and Las Cruces used the CTBS.

Research Design

Design

A pretest-posttest control group design was used to structure treatment schedules, testing, and data collection. This is considered a strong design by Campbell and Stanley (1969) for determining the effects of an intervention when the pretest does not interact with the treatment. We attempted to randomly assign classrooms to groups, but because of scheduling problems, some teachers had to change groups; consequently, the resulting design is quasi-experimental.

Pretest-treatment interaction is not considered a threat in this study with the math achievement and attitude testing. The math tests are not considered to be instructional and the test of attitudes is only indirectly related to treatment. Figure 1, in the previous section, shows the timeline of the treatment and testing schedules which were repeated each year. Figure 2 illustrates the relationship between assignment, treatments, and observations.

Group 1	R	0_1	X	0_3		0_5	
Group 2	R	0_2		0_4	X	0_6	0_7

R = Random assignment

O = Observations (Assessment of interactions, attitudes, and achievement)

X = Treatment

Figure 2. Random assignment, observations, and treatments.

As was noted earlier, random assignment was attempted but was not successful because of predetermined teacher schedules and because some fourth grade students did not have prerequisite multiplication skills. Also, observation number 7 was not conducted because the treatment in all cases extended to the end of the school year.

Regression Effect

The regression effect was not considered a threat when comparing the scores of the mildly handicapped students with the scores off the regular students because the mildly handicapped students were not selected on the basis of the test or tests that were eventually used to measure effect.

Statistical Analysis

A two factor Analysis of Covariance (ANCOVA) was used in a majority of the analysis. Treatment Groups and Type of Student are crossed factors. We originally proposed using an analysis which nested teacher within the other two factors. This analysis method was not possible because some teachers did not have students who were officially receiving special education services. This situation occurred because of scheduling changes which were beyond the control of project personnel.

The ANCOVA was used to analyze the posttest attitude scores, teacher/student interaction, self-esteem scores, and math achievement scores with the respective pretests used as covariates. A repeated measures ANCOVA was proposed to analyze the observational data to determine time by treatment interactions, beginning with the pretreatment observations and continuing through the follow-up assessments; however, a two-way ANCOVA was considered adequate because only a pre and posttest analysis was made.

Statistical and Practical Significance

A priori levels of statistical significance were not established for this research. Rather, the probabilities that mean score differences and interactions occurred by chance were calculated and are reported in the Results and Conclusions Section. For discussion purposes an alpha level of .10 is used. Alpha of .10 is used becaue we expected very small effects with the attitudinal scores.

Practical significance is a function of effect size. Effect size is a measure of the magnitude of the differences between means that is independent of sample size. One way to calculate effect size is to divide the difference between the means of the treatment and control groups by the standard deviation of the pooled, untreated scores. This calculation converts differences to standard deviation units. Effect sizes were calculated and are reported in the Results and Conclusions Section.

RESULTS AND CONCLUSIONS

This section is organized by each of the research questions. Data are presented in tabular form and followed by clarification, interpretation, and conclusions about the findings. A discussion of the findings is contained in the next section.

Throughout this section, Effect Size is referred to as ES and was calculated by dividing the difference between two mean scores by the pooled and weighted standard deviations from the untreated sets of scores. On a pre- to posttest comparison the untreated scores are the pretest scores. On a treatment control group comparison the untreated scores are both sets of pretest scores and the control group posttest scores.

Research Question 1.

Are there significant differences between groups in teacher's attitudes toward mainstreamed handicapped students?

Table 3 shows the total scores from the teacher questionnaire on mainstreaming for both Fall and Spring administrations of year one. As can be seen from the scores and the effect size, there was essentially no difference between the pretest and posttest scores on this test. Consequently, we can conclude that the treatment made no difference, either negative or positive, on teacher attitudes towards mainstreaming. There is 150 points possible on the teacher questionnaire on mainstreaming, and therefore, these teachers were less than neutral about mainstreaming, both at the pretest and posttest. Control group teachers did not receive the teacher questionnaire during the first year.

Table 3. Year 1. Teacher Questionnaire on Mainstreaming, Total Score on 1-5 scale, with 150 points possible for both Spring and Fall.

	Pretest Obs Means (SD) N	**Posttest Obs Means (SD) N**	**Effect Size (ES)**
Treatment Group Fall 1987 (Year 1)	68.50 (13.56) 8	68.50 (12.14) 8	0.0
Treatment Group Fall 1988 (Year 1)	71.50 (6.76) 4	71.00 (9.42) 4	-.01

Table 4 shows the results of the teacher questionnaire on mainstreaming for both the treatment and control group students for Fall of 1988.

Table 4. Fall 1988 (Year 2), Teacher Questionnaire on Mainstreaming.

	Pretest Obs Means (SD) N	**Posttest Obs Means (SD) N**	**Posttest Adj Means**	**ES Pre-Post**
Treatment Group	100.00 (10.36) 8	101.00 (13.27) 8	104.67 8	.10
Control Group	108.25 (7.22) 8	109.12 (8.34) 4	105.46 8	.12
Sta. Prob. P=			.86	
ES Treatment Control			-.08	

The teachers on this administration were considerably more positive towards mainstreaming than during the first year, however, there is very little difference between the pretest and posttest and between the treatment and control groups. As with the first year, it is again concluded that the treatment had no effect on teacher attitude towards mainstreaming.

Table 5 shows the Spring data for the teacher questionnaire on mainstreaming. The teachers scored slightly lower on the posttest than on the pretest. An effect size of -0.32 indicates that the teachers were slightly less positive towards mainstreaming after the treatment.

Table 5. Spring 1989 (Year 2), Teacher Questionnaire on Mainstreaming.

	Pretest Obs Means (SD) N	**Posttest Obs Means (SD) N**	**ES**
Treatment Group	110.50 (10.00) 4	107.25 (8.66) 4	0.32

Table 6 shows the pretest/posttest results of the Teacher Classroom Integration Questionnaire (CIQ) for both Fall and Spring of Year 1.

Table 6. Fall 1987 (Year 1), Teacher Classroom Integration Questionnaire (CIQ), Total Score on 1-5 scale, 125 points possible.

	Pretest Obs Means (SD) N	**Posttest Obs Means (SD) N**	**ES**
Treatment Group	68.00 (8.98) 7	67.43 (4.20) 7	-.06
Treatment Group Spring 1988 (Year 1)	73.00 (5.23) 4	75.00 (5.35) 4	.38

The CIQ test has 125 points possible. The teacher scores indicate a relatively neutral attitude towards classroom integration. There was no difference between the Fall group administrations and a slight difference between the Spring group administration which shows a slight increase with an effect size of 0.38. The treatment group teachers were slightly more positive toward classroom integration at the end of the treatment than they were at the beginning.

Table 7 shows the results of the teacher classroom integration questionnaire for both the treatment and control groups for Fall of 1988. These teachers were more positive than the Year 1 teachers toward classroom integration, but there was very little difference between the pre- and posttest scores.

Table 7. Fall 1988 (Year 2), Teacher Classroom Integration Questionnaire (CIQ).

	Pretest Obs Means (SD) N	**Posttest Obs Means (SD) N**	**Posttest Adj Means**	**ES Pre-Post**
Treatment Group	88.50 (8.67) 8	90.00 (13.19) 8	91.41 8	.17
Control Group	91.38 (11.26) 8	89.00 (19.06) 8	87.59 8	-.21
Sta. Prob. P=			0.59	
ES Treatment Control			0.29	

Table 8 contains data for the pre- and posttests on the (CIQ) for Spring of 1989. With a possible score of 125, these teachers were quite positive towards classroom integration. There was, however, a slight decrease between the Spring and Fall administration. An effect size of -0.32 shows that the teachers were slightly less positive towards classroom integration after the treatment.

Table 8. Spring 1989 (Year 2), Teacher Classroom Integration Questionnaire (CIQ).

	Pretest Obs Means (SD) N	**Posttest Obs Means (SD) N**	**ES**
Treatment Group	110.50 (9.98) 4	107.25 (8.66) 4	-.32

The results of all administrations of both teacher questionnaires shows essentially no significant differences between the pre- and posttests or between the treatment and control groups. There were no statistically significant differences on any of the comparisons, and the effect sizes were small and inconsistent across administrations and treatment groups.

Research Question 2.

Are there significant differences between groups in peer student attitudes toward mainstreamed handicapped students?

Table 9 shows results of the play ratings for both treatment groups for Fall of 1987.

Table 9. Fall 1987 (Year 1), Play Ratings

Categories Treatment Groups	Student Type	N	Pretest Means (SD)	Posttest Means (SD)	Adjusted Posttest Means
	High	20	3.48 (.45)	3.29 (.49)	2.83
Treatment Group	Low	23	2.76 (.75)	2.71 (.81)	2.87
	Low - MH	12	2.80 (.48)	2.63 (.52)	2.75
Total Group Means (SD)		55	3.03 (.68)	2.90 (.70)	2.81
	High	18	3.21 (.52)	3.33 (.55)	3.09
Control Group	Low	16	2.64 (.65)	2.68 (.61)	2.94
	Low-MH	11	2.75 (.52)	2.78 (.52)	2.94
Total Group Means (SD)		45	2.90 (.61)	2.96 (.63)	2.99

The Play Ratings scale uses a 5-point scale with 1 indicating very negative and 5 indicating very positive about liking other students. A score of 3 is a neutral score.

Table 10 shows the results of an Analysis of Covariance using the pretest as a covariate between the two treatment groups and between the three achievement categories. Because of the relatively small cell sizes and because large differences were not expected, an alpha level of 0.1 is used to indicate statistical significance. Table 10 shows statistically significant differences between treatment groups, and there was no statistically significant interaction. A multiple comparisons test shows that the significant difference is between the two groups with mildly handicapped students. An effect size of -0.39 confirms this conclusion. Consequently, it can be concluded that classmates liked the mildly handicapped students less at the end of the treatment than they did at the beginning. This conclusion is also corroborated by an investigation of pretest to posttest differences (See Table 9).

Table 10. Fall 1987 (Year 1), Analysis of Covariance, Play Ratings.

Source of Variation	MS	DF	F	Prob
Within	.12	93		
Regression	24.23	1	202.58	.000
Trt Group	.72	1	6.02	.016
Ach Group	.08	2	.69	.506
T x A	.08	2	.70	.497

Table 11 shows the play rating mean scores for Fall of 1988. Table 12 shows the results of an Analysis of Covariance on the play rating scores.

Table 11. Fall 1988 (Year 2), Play Ratings

Categories Treatment Groups	Student Type	N	Pretest Means (SD)	Posttest Means (SD)	Adjusted Posttest Means
	High	34	3.29 (.47)	3.11 (.44)	2.96
Treatment Group	Low	33	3.16 (.49)	3.01 (.50)	2.96
	Low - MH	36	2.71 (.58)	2.48 (.60)	2.75
Total Group Means (SD)		103	3.04 (.57)	2.86 (.59)	2.89
	High	26	3.24 (.55)	3.15 (.56)	3.04
Control Group	Low	41	3.01 (.66)	2.97 (.64)	3.03
	Low-MH	24	3.12 (.59)	2.98 (.64)	2.96
Total Group Means (SD)		91	3.10 (.61)	3.02 (.62)	3.01

Table 12. Fall 1988 (Year 2), Analysis of Covariance on Play Ratings

Source of Variation	MS	DF	F	Prob
Within	.16	187	0	
Regression	30.73	1	189.74	.000
Trt Group	.68	1	4.21	.042
Ach Group	.40	2	2.47	.088
T x A	.09	2	.56	.570

The results of the 1988 data are almost identical to the 1987 data. These findings have additional validity since the 1988 study is a systematic replication of the 1987 study. The two Spring administrations also show small negative effect sizes from pre- to posttest for the students with mild handicaps. The conclusion again is that the regular students thought less of the students with mild handicaps after the treatment than they did before the treatment.

Table 13 shows the pre- to posttest effect sizes for both positive and negative friendship nominations for MH students only. There were no statistically significant differences on any of the nomination scores between either groups or achievement categories.

Table 13. Pretest to Posttest Sizes for Positive and Negative Friendship Nominations for MH students only.

Study Period		**Positive Nomination ES**	**Negative Nomination ES**
Year 1	Fall 1987	.14	1.05
	Spring 1988	-.45	.03
Year 2	Fall 1988	.00	-.20
	Spring 1989	.17	.20

Table 13 contains only two effect sizes of significance. The Spring 1988 score is a -0.45 which indicates that MH students received fewer positive nominations after the treatment. The Fall 1987 effect size of 1.05 shows that student with mild handicaps received significantly more negative nominations after the treatment. These data corroborate the findings from the Play Rating scores.

Research Question 3.

Are there significant differences between groups in the self-esteem of the students with MH?

Table 14 contains the results of the Mathematics Self-Esteem test which was given during the Fall of 1987. The mean scores show proportions of positive attitude towards mathematics self-esteem. A score of 100 is 100% positive towards mathematics self-esteem.

Table 15 shows the results of an Analysis of Covariance for the Mathematics Self-Esteem instrument for Fall of 1987. As with the play ratings, an alpha level of 0.1 determined statistical significance. Based on a 0.1 probability level, Table 15 shows a statistically significant difference between the two treatment groups. Table 14 shows that the difference favors the treatment group and that the largest difference is with the students with mild handicaps. The effect size between experimental and control students with mild handicaps is 0.51 indicating a moderate increase in self-esteem for the students with mild handicaps. The Spring data for Year 1 shows a smaller increase for mildly handicaps with an effect size of 0.11 (See Appendix B).

Table 14. Fall 1987 (Year 1), Mathematics Self-Esteem

Categories			Pretest	Posttest	Adjusted
Treatment Groups	Student Type	N	Means (SD)	Means (SD)	Posttest Means
	High	20	.86 (.10)	.85 (.10)	.81
Treatment Group	Low	23	.78 (.13)	.80 (.16)	.82
	Low - MH	12	.75 (.16)	.83 (.14)	.87
Total Group Means (SD)		55	.80 (.13)	.83 (.14)	.83
	High	18	.88 (.10)	.84 (.11)	.78
Control Group	Low	16	.79 (.13)	.79 (.16)	.80
	Low-MH	11	.75 (.10)	.77 (.11)	.81
Total Group Means (SD)		45	.82 (.12)	.80 (.13)	.80

Table 15. Fall 1987 (Year 1) Mathematics Self-Esteem.

Source of Variation	MS	DF	F	Prob
Within	.01	93		
Regression	.80	1	80.70	.000
Trt Group	.03	1	3.14	.080
Ach Group	.01	2	1.36	.262
T x A	.00	2	.41	.665

Table 16 shows Mathematics Self-Esteem scores for the SDQ instrument for Fall of 1988. Note that the SDQ is a different self-esteem instrument than was used during Year 1. The SDQ was used because it has stronger reliability data and it has a specific section on mathematics self-esteem.

Table 16. Fall 1988 (Year 2), Mathematics Self-Esteem (SDQ).

Categories					
Treatment Groups	Student Type	N	Pretest Means (SD)	Posttest Means (SD)	Adjusted Posttest Means
Treatment Group	High	29	4.15 (.77)	4.16 (.76)	3.86
	Low	28	3.50 (1.01)	(3.85) (.87)	3.98
	Low - MH	32	3.65 (1.04)	3.74 (1.07)	3.77
Total Group Means (SD)		89	3.77 (.98)	3.91 (.92)	3.87
Control Group	High	25	4.33 (.76)	4.18 (.63)	3.77
	Low	39	3.28 (.99)	3.48 (1.02)	3.75
	Low-MH	24	3.27 (1.12)	3.33 (.91)	3.61
Total Group Means (SD)		88	3.57 (1.07)	3.64 (.95)	3.71

Table 17 contains the Analysis of Covariance data for the SDQ for Fall of 1988. As can be seen from Table 17 there were no statistically significant differences and no statistically significant interaction. There was a small effect size of 0.16 favoring students with mild handicaps in the treatment group. The Spring data, shown in Table B5 (Appendix B) for Year 2 on the SDQ shows essentially the same results with a positive effect size between the pretest and posttest for the students with mild handicaps of 0.22.

Table 17. Fall 1988 (Year 2) Mathematics Self-Esteem (SDQ) Analysis of Covariance.

Source of Variation	MS	DF	F	Prob
Within	.44	170		
Regression	66.15	1	149.90	.000
Trt Group	1.11	1	2.51	.115
Ach Group	.47	2	1.07	.346
T x A	.06	2	.15	.863

As opposed to the Year 1 data, mathematics self-esteem as measured by the SDQ showed little mean score differences between either experimental and control groups or between pretest and posttest scores. The effect sizes were positive but small.

Research Question 4.

Are there significant differences between groups in the type of teacher feedback to students?

Table 18 contains the mean scores of average occurrences per observation periods for academic feedback for Fall of 1987. Table 19 contains an Analysis of Covariance using the pre-treatment observations as a covariate. As can be seen in Table 19, there was a statistically significant difference between the treatment groups on academic feedback. An investigation of the means in Table 19 show relatively large differences between treatment and control group scores across academic achievement groups. The largest difference is between low achievers. The effect size for the difference between scores for the students with mild handicaps is 0.40 which indicates a significant increase in the average occurrence of academic feedback from the teacher. Table B6 in Appendix B shows similar results. The effect size is 0.67 between the pretest and posttest mean scores for low achieving students with mild handicaps.

Table 18. Fall 1987 (Year 1). Academic Feedback.

Categories Treatment Groups	 Student Type	N	Pretest Means (SD)	Posttest Means (SD)	Adjusted Posttest Means
	High	13	1.42 (1.17)	1.67 (1.43)	1.52
Treatment Group	Low	15	1.38 (2.46)	1.93 (1.83)	1.80
	Low - MH	11	.77 (1.76)	1.09 (1.43)	1.24
Total Group Means (SD)		39	1.22 (1.89)	1.61 (1.59)	1.52
	High	18	1.22 (1.38)	1.08 (1.07)	1.02
Control Group	Low	15	1.17 (1.28)	.85 (.82)	.81
	Low-MH	11	.58 (.76)	.55 (.83)	.79
Total Group Means (SD)		44	1.04 (1.22)	.87 (.94)	.87

Table 19. Fall 1987 (Year 1) Analysis of Covariance on Academic Feedback.

Source of Variation	MS	DF	F	Prob
Within	1.13	76		
Regression	41.64	1	36.90	.000
Trt Group	8.30	1	9.35	.008
Ach Group	.59	2	.52	.597
T x A	.64	2	.57	.570

Table 20 contains the Academic Feedback scores for Fall of 1988, and Table 21 contains the associated Analysis of Covariance table. As with the 1987 data, pretreatment observations were used as a covariate. There were no statistically significant differences for either main effect or for the interaction. The interaction, however, is close with the probability of 0.14. An examination of the means shows that the average occurrence of academic feedback for the high and low students in the treatment group was lower than the control group, but the mean score for the students with mild handicaps was considerably higher than the control group. The effect size for students with mild handicaps is 0.31 which indicates a small difference between the treatment and control group students with mild handicaps. The Spring 1989 Academic Feedback data does not correspond to the Fall data. The Spring data (Table B6) show a slight decrease in academic feedback occurrences for the mild handicap students from pretest to posttest.

Table 20. Fall 1988 (Year 2) Academic Feedback.

Categories					
Treatment Groups	Student Type	N	Pretest Means (SD)	Posttest Means (SD)	Adjusted Posttest Means
	High	34	1.67 (1.10)	2.19 (.83)	2.25
Treatment Group	Low	33	2.10 (1.70)	1.96 (1.12)	1.87
	Low - MH	36	2.14 (1.57)	2.33 (1.42)	2.23
Total Group Means (SD)		103	1.97 (1.48)	2.17 (1.16)	2.12
	High	26	1.35 (1.14)	2.41 (1.82)	2.58
Control Group	Low	41	2.11 (1.48)	2.49 (2.19)	2.40
	Low-MH	24	1.65 (1.58)	1.67 (1.67)	1.73
Total Group Means (SD)		91	1.77 (1.44)	2.25 (1.97)	2.23

Table 21. Fall 1988 (Year 2), Academic Feedback.

Source of Variation	MS	DF	F	Prob
Within	2.29	187		
Regression	44.58	1	19.48	.000*
Trt Group	.65	1	.28	.595
Ach Group	2.79	2	1.22	.298
T x A	5.58	2	2.00	.138

Research Question 5.

Are there significant differences between groups in the quality of teacher feedback to students?

A check of the occurrences of negative feedback shows that the proportion of negative feedback in the Year 1 study is less than 0.3%. In the Year 2 study the occurrence of negative feedback is approximately 1%. Because of these extremely low proportions it is not necessary to analyze the quality of feedback. Essentially all of the academic feedback was either neutral or positive and therefore the analysis for Research Question 4 answers the questions for Research Question 5.

Research Question 6.

Are there significant differences in math achievement between the mainstreamed students and the three categories of regular education students?

Table 22 contains the mean scores for the percentage of correct answers on a fractions Criterion Referenced Test (CRT) for Fall of 1987. Table 23 contains the results of an Analysis of Covariance for the fractions criterion referenced test.

Table 22. Fall 1987 (Year 1), Percentage correct on Fractions CRT.

Categories Treatment Groups	Student Type	N	Pretest Means (SD)	Posttest Means (SD)	Adjusted Posttest Means
	High	20	36.93 (31.92)	90.18 (8.43)	85.22
Treatment Group	Low	23	29.14 (30.59)	73.00 (16.11)	90.21
	Low - MH	12	13.30 (12.50)	65.20 (14.79)	66.82
Total Group Means (SD)		55	28.52 (29.14)	77.54 (16.64)	74.08
	High	18	23.00 (12.27)	31.09 (19.22)	30.01
Control Group	Low	16	8.33 (6.91)	13.71 (12.70)	16.71
	Low-MH	11	3.99 (5.03)	4.15 (5.34)	8.36
Total Group Means (SD)		45	13.14 (12.22)	18.32 (18.13)	18.36

Table 23. Fall 1987 (Year 1), Percentage Correct on Fraction CRT.

Source of Variation	MS	DF	F	Prob
Within	160.75	93		
Regression	3500.47	1	21.78	.000
Trt Group	65,189.58	1	405.53	.000
Ach Group	2955.28	2	18.38	.000
T x A	43.60	2	.27	.763

There are statistically significant and large differences between the treatment group and the control group. The control group did not receive instruction in fractions, and therefore we would expect little gain from the pre- to the posttest. There was also a statistically significant and fairly large difference between each of the achievement groups which also might be expected. Table B8 in Appendix B shows similar gains for the Spring 1988 study. Figure 3 provides a graphical representation of the gains and follow-up scores for the Fall and Spring studies. It is of interest to note that the low achieving students with mild handicaps have a learning rate that is approximately the same as the high achieving students.

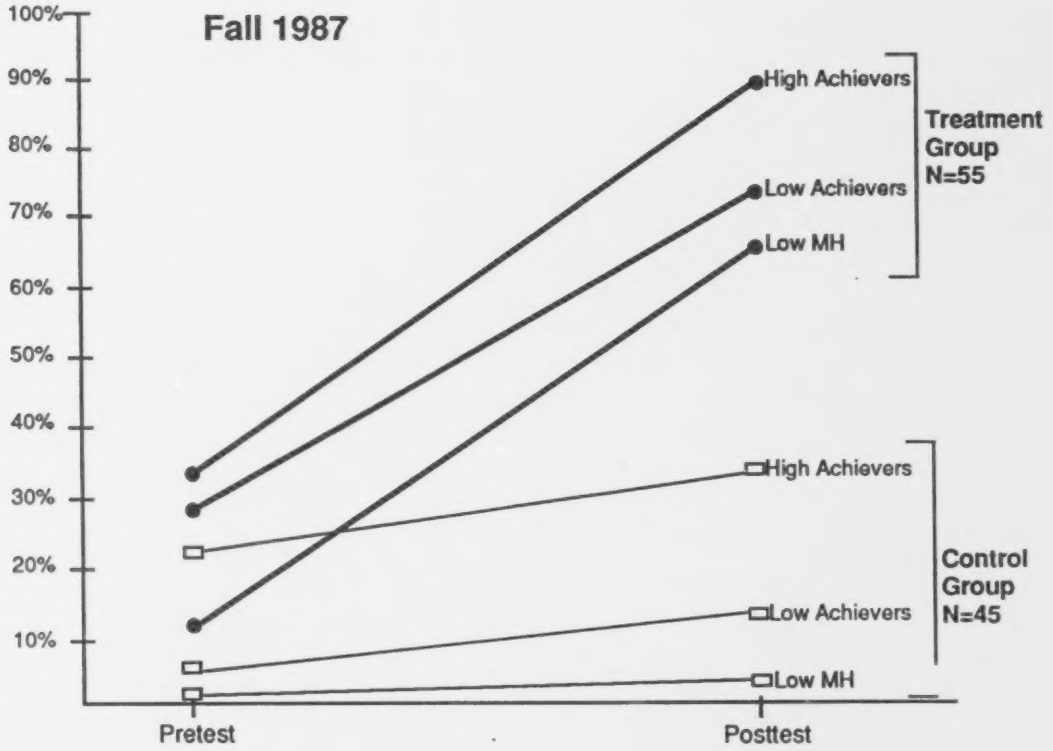


Figure 3. Mean percentage score on a criterion referenced test on fractions, 1987 study.

Table 24 shows the mean scores for percentage of correct answers on the Fraction CRT for Fall of 1988. Table 25 shows the Analysis of Covariance for Fraction CRT for Fall of 1988.

Table 24. Fall 1988 (Year 2), Percentage Correct on Fractions CRT.

Categories			Pretest Means (SD)	Posttest Means (SD)	Adjusted Posttest Means
Treatment Groups	Student Type	N			
Treatment Group	High	34	15.74 (18.79)	85.14 (13.10)	82.79
	Low	33	5.42 (5.77)	67.57 (22.95)	69.57
	Low - MH	36	5.16 (3.89)	67.15 (20.20)	69.26
Total Group Means (SD)		103	8.74 (12.42)	73.22 (20.77)	73.87
Control Group	High	26	21.05 (16.22)	23.62 (15.52)	19.02
	Low	41	7.40 (7.80)	8.26 (9.86)	9.42
	Low-MH	24	6.21 (6.14)	3.36 (3.54)	5.03
Total Group Means (SD)		91	10.99 (12.29)	11.36 (13.35)	11.16

Table 25. Fall 1988 (Year 2)

Source of Variation	MS	DF	F	Prob
Within	229.37	170		
Regression	4015.47	1	17.94	.000
Trt Group	181,512.23	1	791.36	.000
Ach Group	2563.36	2	11.18	.000
T x A	83.98	2	.37	.694

As with the Year 1 study, there were statistically significant and large differences between the treatment groups and the achievement groups. This trend is also evident in Table B9 (Appendix B) which reflects the results of the Spring 1989 study. Figure 4 presents a graphical representation of the CRT mean scores for the second year study.

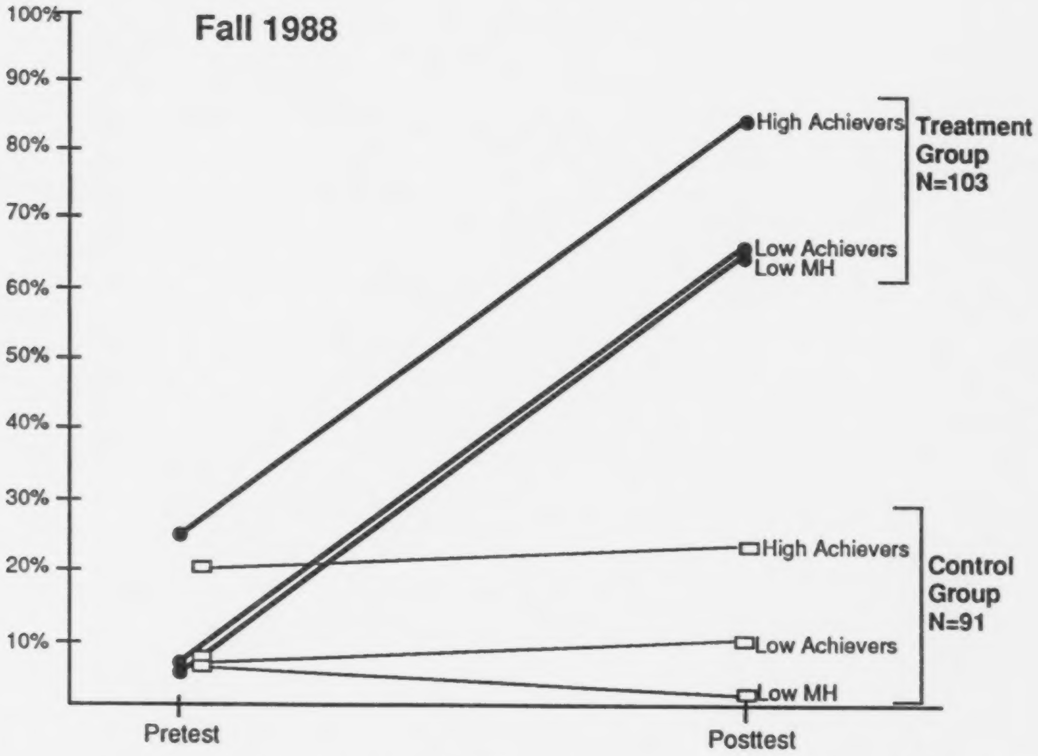


Figure 4. Mean percentage score on a criterion referenced test on fractions, 1988 study.

Table 26 contains the mean scores for the Mathematics Subtest of the SAT for Fall of 1987. Only the SAT pretest was administered to the control group students for the Fall 1987 study. SAT pretests were used as a classification variable. As can be seen by comparing the pre- and posttest means, there was very little difference between the pre- and posttest. This result is expected because a very small number of items in the SAT Mathematics subtest deal with Fractions.

Table 26. Fall 1987 (Year 2), Mean Scores on Mathematics Subtest of SAT, Percentage Correct.

Categories Treatment Groups	Student Type	N	Pretest Means (SD)	Posttest Means (SD)
	High	19	73.28 (8.69)	81.58 (10.30)
Treatment Group	Low	22	42.76 (11.44)	47.46 (15.20)
	Low - MH	12	36.70 (19.40)	36.06 (19.82)
Total Group Means (SD)		53	52.51 (20.38)	59.11 (23.95)

Table 27 contains standardized test scores for the ITBS and CTBS for Fall of 1988. Table 28 contains an analysis of the covariance on the standardized test scores.

Table 27. Fall 1988 (Year 2), Grade Equivalent Scores on Mathematics Subtest of Standardized Tests (ITBS & CTBS)

Categories Treatment Groups	 Student Type	N	Pretest Means (SD)	Posttest Means (SD)	Adjusted Posttest Means
	High	34	6.17 (.84)	6.76 (1.44)	5.02
Treatment Group	Low	33	3.96 (.52)	4.91 (.90)	5.38
	Low - MH	36	3.88 (.57)	4.59 (.74)	5.14
Total Group Means (SD)		103	4.66 (1.25)	5.40 (1.43)	5.18
	High	8	5.62 (.50)	5.94 (1.40)	4.75
Control Group	Low	30	3.43 (.49)	4.22 (.66)	5.22
	Low-MH	17	3.51 (.46)	3.81 (.52)	4.73
Total Group Means (SD)		55	3.78 (.90)	4.34 (1.02)	4.90

Table 28. Fall 1988 (Year 2), Grade Equivalent Scores on Mathematics Subtests on Standardized Tests (ITBS & CTBS).

Source of Variation	MS	DF	F	Prob
Within	.60	151		
Regression	55.08	1	92.26	.000
Trt Group	2.07	1	3.47	.065
Ach Group	2.02	2	3.39	.036
T x A	.21	2	.35	.708

There were statistically significant differences between the treatment groups and the achievement groups. An investigation of the adjusted posttest means shows the largest difference is between the low achieving students with mild handicaps. The effect size for students with mild handicaps between the treatment and control group is 0.77. The gain from pre- to posttest for the students with mild handicaps (0.71) represents a gain of nearly three-fourths of one year in a three month period. The data in Table B11 for the Spring 1989 data shows similar results with an effect size of 0.65 for the students with mild handicaps.

Language Assessment Scales (LAS)

The Language Assessment Scales (LAS) was administered to students who may have language problems. LAS administration was restricted to the Las Cruces site. LAS testing does not correspond to any of the Research Questions, however, LAS testing was conducted to help determine if the treatment differentially effected students with language problems. The testing revealed that the students likely had little language problems since all students fell into the middle categories of bilingual (3) or little Spanish (4). Table 29 shows the mean scores on the Fractions CRT for each treatment group by LAS classification.

Table 29. Mean scores on the Fractions CRT by Treatment Group and LAS rating.

Group	LAS Classification		
	Bilingual Means	Little Spanish Means	Total Means
Treatment	71.26	78.78	75.02
Control	2.36	5.67	4.02
Total	36.80	42.20	39.50

As would be expected there was a large and statistically significant difference between the treatment and control group mean scores. There was a moderate but not statistically significant difference between LAS classifications. The Effect Size is 0.43 with a difference between students who are bilingual and students who have little Spanish. The mean score of 71.26 for the bilingual students is less than the high achieving students received on the CRT and slightly more than the low achieving and low achieving students with mild handicaps. Consequently, the bilingual students had little problems with the Fractions instruction. The students with little Spanish came very close to an average 80% mastery.

Additional Research

One of the Research Associates, William H. Lowry, completed a doctoral dissertation as part of this project. An abstract of the dissertation is contained in Appendix D. The dissertation study primarily investigated the relationship between self-esteem (self perception) and achievement when the achievement is produced by a direct instructional program. All regular education students from all classrooms in this study were included in the dissertation study. Mr. Lowry also conducted observations of program implementation. A graphical representation of the relationship between program implementation and achievement is contained in Figure 5. As can be seen, there is a direct relationship between program implementation and achievement as measured by the Fractions Criterion Referenced Test.

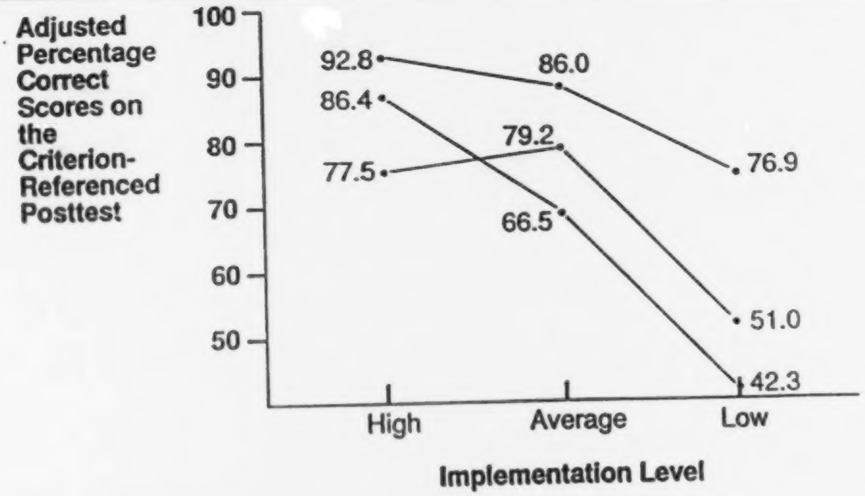


Figure 5. Interaction diagram for implementation and achievement group.

DISCUSSION SECTION

There are numerous reasons to mainstream students with mild handicaps and numerous professionals and parents who advocate mainstreaming. There are, however, acknowledged problems with the mainstreaming process. Regular teachers feel the burden of teaching large groups of children with widely ranging achievement histories, and children face challenges associated with any type of legislated integration.

The purpose of this project was to help find instructional programs which would help alleviate some of the problems associated with mainstreaming. It was hypothesized that a program based on research validated effective teaching procedures would provide added structure to the classroom, encourage greater teacher and student interactions, elicit participation by all students and provide the instruction necessary for high success rates by all students; all of which would help mainstreaming. In designing this project we assumed that greater student interactions and higher achievement would foster positive teacher attitudes toward mainstreaming and more positive attitudes of regular students to their peers with mild handicaps. Some of these assumptions were sustained by the project findings and some were not.

In general, the regular teachers involved in the first year's study were neutral about mainstreaming. The second year teachers were more positive about mainstreaming, but the teachers in both years of the study maintained their opinions about mainstreaming through the course of the project. On an informal interview basis the teachers reported that they liked the program because it reduced some of their instructional responsibilities and allowed them more time for classroom management. On the other hand, the program is quite demanding, and requires that teachers spend more time with individual students. As will be discussed later, the students with mild handicaps did experience additional teacher interactions and did achieve quite well with difficult to learn concepts. We might conclude that this extra demand on teacher time dampened any change in opinion on mainstreaming which may have resulted from increased student achievement. A finer analysis of the items of the teacher questionnaires will be made in an attempt to gain additional insight on this question.

We assumed that if children with mild handicaps showed uncommon achievement gains, the students with mild handicaps would increase their self esteem and regular students would be more positive toward their handicapped peers. The students with mild handicaps did show quite large achievement gains and did increase their self esteem. These changes did not, however, positively influence peer attitude toward students with mild handicaps. In fact, there is fairly strong evidence that peer attitudes towards mildly handicapped students declined significantly during the course of the project. This is one of the more disappointing findings of the study, but we feel we know at least part of the reason for a decrease in positive peer attitudes, and we feel there is a relatively straight forward change that can be made to the program which may remediate this problem.

We feel the peer attitude problem may be caused by the slower students taking more time to go through the guided practice portions of the program. The guided practice portions are one of the stronger components of the program, but they do require each student to complete a certain number of problems before the program continues. When students are having problems, the teacher is directed to attend to these problems. This results in extra help for the slower students, but it also results in the faster students being held up. Because of the highly structured nature of the program, students are required to wait until the teacher resumes the videodisc instruction. This process can become frustrating for students who complete the guided practice problems quickly. We feel that changing the classroom structure to a cooperative learning structure will greatly reduce this problem. In a cooperative learning environment the faster students would have the responsibility and opportunity to work with other students in the group. We are currently conducting research to investigate this hypothesis.

As noted earlier, the students with mild handicaps increased their self esteem significantly during the first year but less so during the second year. Effect sizes of 0.51, 0.11, 0.16, and 0.22 are not dramatic but important. They counter a general trend of declining self esteem by the majority of students with mild handicaps. We feel the slight increase in self esteem towards mathematics is a result of the students with mild handicaps receiving increased teacher attention and maintaining a relatively high success rate on difficult to learn concepts.

Students with mild handicaps made large gains as measured by the Fractions criterion referenced test. They also made small but significant gains on the standardized achievement test and received a significant increase in teacher interactions. We believe all of these findings are interrelated. The increased teacher/student interaction was predominantly academic. This is a reverse of earlier studies which showed that students with mild handicaps receive a proportionally large number of teacher/student interactions but the majority of these interactions were behavioral or procedural. We feel the highly structured nature of the program contributed to the increased number of academic teacher/student interactions. We also feel that the highly structured and tightly designed nature of the program resulted in increased student achievement. The program is based on theories of direct instruction which advocate small steps to maintain a high success rate. This method of instruction has been shown in numerous studies to be effective with students with mild handicaps.

With regard to the cross-cultural aspects of the study, we found very little difference between the Spanish-speaking students and the students who had no potential language problem. This was true in both the Las Cruces and Ogden school districts. We anticipated a greater number of students with language problems in the Las Cruces district, however, all the students who took the LAS showed a good command of the English language. Those students scored as bilingual on the LAS had achievement results comparable to middle achieving students. 0

In general we feel the program was successful in teaching students with mild handicaps difficult concepts, and possibly a small increase in self esteem will help with future school experiences. Additional research is needed to investigate a different classroom structure. As noted earlier, we feel strongly that a cooperative learning environment would greatly enhance the videodisc program. We believe that programs such as the Mastering Fractions program, if implemented correctly and when used in a cooperative classroom structure, have a strong potential for assisting regular teachers.

REFERENCES

Asher, S.R., & Hymel, S. (1981). Children's social competence in peer relations: Sociometric and behavioral assessment. In J.D. Wine and M.D. Syme (Eds.), Social Competence. NY: Gardner Press.

Bickel, W.E. & Bickel, D.D. (1986). Effective Schools, Classrooms, and Instruction: Implications for Special Education. Exceptional Children, 52(6), 489-500.

Brophy, J.E., & Good, T.L. (1986). Teacher behavior and student achievement. In M.C. Wittrock (Ed.), Handbook of research on teaching, (3rd ed.) New York: MacMillan. 328-375.

Bryan, T.H. (1972). An observational analysis of classroom behaviors of children with learning disabilities. Journal of Learning Disabilities, 7, 26-34.

Campbell, D.T., & Stanley, J.C. (1969). Experimental and quasi-experimental designs for research. Chicago: Rand McNally.

Carnine, D., Engelmann, S., Hofmeister, A., & Kelly, B. (1986). Videodisc instruction in fractions. Unpublished manuscript, Systems Impact, Inc.

Chapman, R. (1974). Differential interactions between classroom teachers and learning disabled children. Unpublished doctoral dissertation, University of Texas at Austin.

Engelmann, S., & Carnine, D. (1982). Theory of Instruction: Principles and Applications. New York: Irvington Publishers, Inc.

Esposito, B.G. & Reed II, T.M., (1986). The Effects of Contact with Handicapped Persons on Young Children's Attitudes. Exceptional Children, 53, 224-229.

Fink, W.T. (1977). An investigation of teacher consequation in unstructured social interactions with mildly handicapped, moderately handicapped and "typical" children. Unpublished doctoral dissertation, Department of Special Education, University of Oregon.

Good, T.L., Biddle, B.J., & Brophy, J.E. (1983). Teaching effectiveness: Research findings and policy implications. ERIC Document #ED 245351.

Good, T.L., Grouws, D.A., & Edmeier, H. (1983). Active mathematics teaching. New York: Longman.

Green, G. & Thorkildsen, R. (1986). A microcomputer-based extended day/year project in math. Paper presented at the meeting of the Council for Exceptional Children, New Orleans.

Gresham, Frank M. (1986). Strategies for Enhancing the Social Outcomes of Mainstreaming: A Necessary Ingredient for Success. In Meisel, C. Julius (Ed.) Mainstreaming Handicapped Children (pp. 193-218). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

Guetzloe, E. & Cline, R. (1983). Compensation for Regular Classroom Teachers: State and Territorial Provisions, Exceptional Children, 49, 363-366.

Huron, T., & Skinner, M.C. (1981). Criteria for defining the regular classroom as the least restrictive environment for learning disabled students. Learning Disabilities Quarterly, 4, 115-121.

Hofmeister, A.M., Engelmann, S., Carnine, D. (1986). Videodisc technology: Providing instructional alternatives. Journal of Special Education Technology.

Hopkins, K.D. (1982). The unit of analysis: Group means versus individual observations. American Educational Research Journal, 19, 5-18.

Kaufman, M., Agard, J.A., & Semmel, M.I. (1985). Mainstreaming: Learners and Their Environment. Cambridge, MA: Brookline Books.

Kenny, D.A. (1979). The Nonequivalent Control Group. Correlation and Causality New York, NY: John Wilely & Sons, 206-226.

Larrivee, B. (1982). Factors Underlying Regular Classroom Teachers' Attitude Toward Mainstreaming, Psychology in the Schools, 19, 374-379.

Larrivee, B. (1985). Effective Teaching for Successful Mainstreaming. New York: Longman.

Lewis, R.B. & Doorlag, D.H. (1983). Teaching Special Students in the Mainstream. Columbus: Charles E. Merrill Publishing Company.

Lovitt, T.C. (1977). In spite of my resistance. . . I've learned from children. Columbus, OH: Charles E. Merrill.

McConnell, S.R., & Odem, S.L. (1984). Sociometrics: Peer-referenced measures and the assessment of social competence. In Strain, P.S., Gurainick, M., & Walker, H.M. (Eds.), Children's social behavior: Development, assessment, and modification. New York: Academic Press.

Merrill, M.D. (1973). The component display theory. In C.M. Reigeluth (Ed.), Instructional design theories and models: An overview of their current status. Hillsdale, NJ: Lawrence Erlbaum.

Meisel, C. Julius (1986). The Social Comparison Behavior of Academically Handicapped Students in Mainstream Classes. In Meisel, C. Julius (Ed.) Mainstreaming Handicapped Children (pp. 77-94). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

Reynolds, B.J., Martin-Reynolds, J., & Mark, F.D. (1982). Elementary Teachers' attitudes toward mainstreaming educable mentally retarded students. Education and Training of the Mentally Retarded, 17, 171-176.

Reynolds, M.C., Wang, M.C., & Walberg, H.J. (1987). The Necessary Restructuring of Special and Regular Education. Exceptional Children, 53(5), 391-398.

Reigeluth, C.M., & Stein, F.S. (1983). The elaboration theory of instruction. In C.M. Reigeluth (Ed.), Instructional design theories and models: An overview of their current status. Hillsdale, NJ: Lawrence Erlbaum.

Salvia, John and Munson, Susan (1986). Attitudes of Regular Education Teachers Toward Mainstreaming Mildly Handicapped Students. In Meisel, C. Julius (Ed.) Mainstreaming Handicapped Children (pp. 111-128). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

Shavelson, R. J., & Marsh, H.W. (1986). On the structure of self-concept. In R. Schwarzer, Self-related cognitions in anxiety and motivation. Hillsdale, NJ: Lawrence Erlbaum.

Siperstein, Gary N., and Bak, John J. (1986). Understanding Factors that Affect Children's Attitudes Toward Mentally Retarded Peers. In Meisel, C. Julius (Ed.), Mainstreaming Handicapped Children (pp. 55-77). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

Stainback, W., & Stainback, S. (1984). A rationale for the merger of special and regular education. Exceptional Children, 52(2), 102-111.

Thompson, R.H., White, K., & Morgan, D.P. (1982). Teacher/Student Interaction Patterns in classrooms with mildly handicapped students. American Educational Research Journal, 19, 220-236.

Van Patten, J., Chun-I, C., & Reigeluth, C.M. (1986). A Review of Strategies for Sequencing and Synthesizing Instruction. Review of Educational Research, 56, 437-471.

Videodisc Monitor (1987). 5, 20-21.

Werry, J., & Quay, H. (1969). Observing the Classroom behavior of elementary school children. Exceptional Children, 35, 461-470.

Will, M. (1986). Educating students with learning problems -- A shared responsibility. A report to the U.S. Secretary of Education. Washington, D.C.

APPENDIX

APPENDIX A

Measures and
Scoring Procedures

Classroom Integration Questionaire

Classroom Integration Questionnaire

The Classroom Integration Questionnaire (from Kaufman, M., Agard, J. A., & Semmel, M. I. (1985). Mainstreaming: Learners and their environments. Cambridge, MA: Brookline Books.) is one of two measures that will be used to assess teacher attitudes toward mainstreaming.

Teachers will be asked to choose the most appropriate placement for each child in a set of 25 items. Teachers may choose from the following options (a) in the regular classroom, (b) in the regular classroom all day with supplemental materials and advice, (c) in the regular classroom plus the resource room, (d) in the special self-contained classroom, and (e) exclusion from public education.

DIRECTIONS

Teachers may complete the checklist and return it within a 2 or 3 days. The checklist will be used as a pre- and post- measure of teacher's attitudes toward mainstreaming.

KEY
MAX = 125

Classroom Integration Questionnaire

Teacher ______________________ Date ______________________

School ____

Directions: Read each behavioral description and write the corresponding letter to the left of each item as follows:

5 — a. in regular classroom
4 — b. in regular classroom all day with supplemental materials and advice
3 — c. in regular classroom part of the day with supplemental materials and advice
2 — d. in special class all day
1 — e. not for public education

(Write only one letter per item)

C ____ 1. Although Eric seems very bright doing science experiments and other activities involving manipulation of materials, he still does poorly in his reading and arithmetic assignments.

S ____ 2. Richard is overly dependent on the teacher. He seeks out excessive adult attention. He has no sense of self-direction. He never does anything without being pushed or prodded.

C ____ 3. Chuck doesn't seem able to catch on to things as quickly as most, and needs to have things explained over and over again; eventually, though, he appears to learn everything the others do, even though it has taken longer.

S ____ 4. Florence is immature and oversensitive, likely to burst into tears at the slightest provocation. She pouts or sulks if she can't do what she wants to do.

S ____ 5. Alfred is defiant and stubborn, likely to argue with the teacher, be willfully disobedient and otherwise interfere with the normal classroom discipline.

C ____ 6. John frequently misinterprets simple statements and directions given to the group; he does better if he can repeat the directions to the teacher.

S ____ 7. Doris is absent-minded and a daydreamer; she seems unusually quiet and withdrawn, avoids others and is inhibited and restrained in her behavior.

S ____ 8. Timmy is overly aggressive. He seems to pick fights, tease and bully other children. He is a poor sport and argues about rules and decisions.

Key

S ____ 9. Jerry does reasonably good work as long as he is left alone; he becomes extremely tense and anxious, however, whenever an adult speaks to him. He becomes very upset when he makes a mistake and just freezes up when called on in class.

C ____ 10. Dotty is eight; she has difficulty following the class activities, and doesn't seem able to learn to read at all.

S ____ 11. Richard is a likeable boy; he makes friends easily and is very sensitive of how others see him. He is two years behind his peers in math skills and four years behind in reading.

C ____ 12. Stella can read orally, but doesn't comprehend the meaning of what she reads. She can identify all the words in a sentence, but cannot paraphrase the sentence or tell what it means.

S ____ 13. Martha is a hyperactive child. She is always jumping out of her seat, running around the room; she can't seem to sit still for any length of time. While she's running around, she annoys and disrupts other children.

C ____ 14. Betty works very rapidly and usually is the first one finished in her section. However, most of her responses are incorrect.

S ____ 15. Chester is deceitful, tells lies and cheats in school and at play; he has been involved in several thefts and is a persistent truant.

C ____ 16. Sammy, in second grade, can't correctly repeat oral directions or correctly repeat a 7-10 word statement He omits and/or transposes words, can't recite days of the week, the alphabet or numbers in order.

S ____ 17. Judy eventually mutilates or destroys everything that gets into her hands; her books are marked and torn, her desk is inkstained and scarred, and she has even managed to crack a blackboard panel.

S ____ 18. Carla is a persistent walker, whisperer and notepasser.

C ____ 19. Beth is not able to achieve in any area of academics on a level with the other children. All areas of academics must be done on an individual basis.

C ____ 20. Milly is slow to comprehend instructions that involve directionality. She is confused about left-right, up-down and confuses prepositions (over, under) in her oral expression.

Key

3 ____ 21. Earl is eight and wears cowboy boots to class because he hasn't learned to tie his own shoelaces; he is generally cheerful and well-behaved, but talks very little in class and is incapable of doing anything but the most simple work assignments.

2 ____ 22. Susan frequently reads words and numbers reversed and confuses similar words and letters when reading, but does alright with oral spelling.

5 ____ 23. Brenda seems very unhappy and depressed in school. She sometimes appears to have been crying and never seems to smile even when she's playing with the other children.

2 ____ 24. Billy tends to skip words while reading and needs to use a moving finger, pencil or other artifact to avoid omissions.

5 ____ 25. Alan seems to have very few friends. He stays by himself most of the time watching the other children. He is never chosen for games and never interacts with other children about his school work.

APPENDIX M

A Survey of Teachers' Opinions Relative to Mainstreaming Special-Needs Children

Recent legislation requires that children with special needs be integrated into the regular classroom to the extent that such integration is possible. Educators have long realized that one of the most important influences on a child's educational progress is the classroom teacher. The purpose of this questionnaire is to obtain information that will aid school systems in maximizing the effectiveness of teachers with special-needs children placed in their classroom.

Section I: Background Variables

Please *circle* your response to the following items.

1. Grade level taught	K	1–3	4–6	7–9	10–12
2. Number of students in your class	11–15	16–20	21–25	26–30	31–35
3. Number of students in your school	1–300	301–600	601–900	901–1200	1200+
4. Type of school	urban		suburban	rural	
5. My degree of success to date in dealing with special-needs students in the regular classroom has been	very low	low	average	high	very high
6. The level of administrative support I have received relative to special-needs students has been	very low	low	average	high	very high
7. The availability of additional support services for accommodating special-needs students—such as resource room, resource teacher, remedial reading teacher, counseling, appropriate instructional materials, etc.—has been	very low	low	average	high	very high

From Larrivee, B., & Cook, L. (1979). Mainstreaming: A study of the variables affecting teacher attitude. *Journal of Special Education, 13*(3), 315–324. Reprinted by permission.

Section II: Teacher Opinions

Please *circle* the number under the column that best describes your agreement or disagreement with the following statements. There are no correct answers; the best answers are those that honestly reflect your feelings.

Scale: SA = Strongly agree
D = Disagree
A = Agree
SD = Strongly disagree
U = Undecided

	SA	A	U	D	SD
1. Many of the things teachers do with regular students in a classroom are appropriate for special-needs students.	~~1~~ 5	~~2~~ 4	~~3~~ 3	~~4~~ 2	~~5~~ 1
2. The needs of handicapped students can best be served through special, separate classes.	1	2	3	4	5
3. The classroom behavior of a special-needs child generally requires more patience from the teacher than does the behavior of a normal child.	1	2	3	4	5
4. The challenge of being in a regular classroom will promote the academic growth of the special-needs child.	~~1~~ 5	~~2~~ 4	~~3~~ 3	~~4~~ 2	~~5~~ 1
5. The extra attention special-needs students require will be to the detriment of the other students.	1	2	3	4	5
6. Mainstreaming offers mixed-group interaction that will foster understanding and acceptance of differences.	~~1~~ 5	~~2~~ 4	~~3~~ 3	~~4~~ 2	~~5~~ 1
7. It is difficult to maintain order in a regular classroom that contains a special-needs child.	1	2	3	4	5
8. Regular teachers possess a great deal of the expertise necessary to work with special-needs students.	~~1~~ 5	~~2~~ 4	~~3~~ 3	~~4~~ 2	~~5~~ 1
9. The behavior of special-needs students will set a bad example for the other students.	1	2	3	4	5
10. Isolation in a special class has a negative effect on the social and emotional development of a special-needs student.	~~1~~ 5	~~2~~ 4	~~3~~ 3	~~4~~ 2	~~5~~ 1
11. The special-needs child will probably develop academic skills more rapidly in a special classroom than in a regular classroom.	1	2	3	4	5
12. Most special-needs children do not make an adequate attempt to complete their assignments.	1	2	3	4	5
13. Integration of special-needs children will require significant changes in regular classroom procedures.	1	2	3	4	5
14. Most special-needs children are well behaved in the classroom.	~~1~~ 5	~~2~~ 4	~~3~~ 3	~~4~~ 2	~~5~~ 1

	SA	A	U	D	SD
15. The contact regular class students have with mainstreamed students may be harmful.	1	2	3	4	5
16. Regular classroom teachers have sufficient training to teach children with special needs.	~~1~~ 5	~~2~~ 4	~~3~~ 3	~~4~~ 2	~~5~~ 1
17. Special-needs students will monopolize the teacher's time.	1	2	3	4	5
18. Mainstreaming special-needs children will promote their social independence.	~~1~~ 5	~~2~~ 4	~~3~~ 3	~~4~~ 2	~~5~~ 1
19. It is likely that a special-needs child will exhibit behavior problems in a regular classroom setting.	1	2	3	4	5
20. Diagnostic-prescriptive teaching is better done by resource-room or special teachers than by regular classroom teachers.	1	2	3	4	5
21. The integration of special-needs students can be beneficial for regular students.	~~1~~ 5	~~2~~ 4	~~3~~ 3	~~4~~ 2	~~5~~ 1
22. Special-needs children have to be told exactly what to do and how to do it.	1	2	3	4	5
23. Mainstreaming is likely to have a negative effect on the emotional development of the special-needs child.	1	2	3	4	5
24. Increased freedom in the classroom creates too much confusion.	1	2	3	4	5
25. The special-needs child will be socially isolated by regular classroom students.	1	2	3	4	5
26. Parents of a special-needs child present no greater problem for a classroom teacher than those of a normal child.	~~1~~ 5	~~2~~ 4	~~3~~ 3	~~4~~ 2	~~5~~ 1
27. Integration of special-needs children will necessitate extensive retraining of regular teachers.	1	2	3	4	5
28. Special-needs students should be given every opportunity to function in the regular classroom setting, where possible.	~~1~~ 5	~~2~~ 4	~~3~~ 3	~~4~~ 2	5 1
29. Special-needs children are likely to create confusion in the regular classroom.	1	2	3	4	5
30. The presence of special-needs students will promote the acceptance of differences on the part of regular students.	~~1~~ 5	~~2~~ 4	~~3~~ 3	~~4~~ 2	5 1

Teacher Opinions Relative to Mainstreaming

Put the "score" for
Section II here ⟶

A Survey of Teachers' Opinions Relative to Mainstreaming Special-Needs Children

Teacher ______________________ Date ______________________

School ______________________

Recent legislation requires that children with special needs be integrated into the regular classroom to the extent that such integration is possible. Educators have long realized that one of the most important influences on a child's educational progress is the classroom teacher. The purpose of this questionnaire is to obtain information that will aid school systems in maximizing the effectiveness of teachers with special-needs children placed in their classroom.

Section I: Background Variables

Please circle your response to the following items.

1.	Grade level taught	1 K	2 1-3	3 4-6	4 7-9	5 10-12
2.	Number of students in your class	1 11-15	2 16-20	3 21-25	4 26-30	5 31-35
3.	Number of students in your school	1 1-300	2 301-600	3 601-900	4 901-1200	5 1200+
4.	Type of school	1 urban		2 suburban		3 rural
5.	My degree of success to date in dealing with special-needs students in the regular classroom has been	1 very low	2 low	3 average	4 high	5 very high
6.	The level of administrative support I have received relative to special-needs students has been	1 very low	2 low	3 average	4 high	5 very high
7.	The availability of additional support services for accommodating special-needs students--such as resource room, resource teacher, remedial reading teacher, counseling, appropriate instructional materials, etc.--has been	1 very low	2 low	3 average	4 high	5 very high

Each of these responses will be entered on the computer sheet directly.

Section II: Teacher Opinions

Please circle the number under the column that best describes your agreement or disagreement with the following statements. There are no correct answers; the best answers are those that honestly reflect your feelings.

Scale: SA = Strongly agree A = Agree D = Disagree
U = Undecided SD = Strongly disagree

		SA	A	U	D	SD
1.	Many of the things teachers do with regular students in a classroom are appropriate for special-needs students.	~~1~~ 5	~~2~~ 4	~~3~~ 3	~~4~~ 2	~~5~~ 1
2.	The needs of handicapped students can best be served through special, separate classes.	1	2	3	4	5
3.	The classroom behavior of a special-needs child generally requires more patience from the teacher than does the behavior of a normal child.	1	2	3	4	5
4.	The challenge of being in a regular classroom will promote the academic growth of the special-needs child.	~~1~~ 5	~~2~~ 4	~~3~~ 3	~~4~~ 2	~~5~~ 1
5.	The extra attention a special-needs student requires will be to the detriment of the other students.	1	2	3	4	5
6.	Mainstreaming offers mixed-group interaction that will foster understanding and acceptance of differences.	~~1~~ 5	~~2~~ 4	~~3~~ 3	~~4~~ 2	~~5~~ 1
7.	It is difficult to maintain order in a regular classroom that contains a special-needs child.	1	2	3	4	5
8.	Regular teachers possess a great deal of the expertise necessary to work with special-needs child.	~~1~~ 5	~~2~~ 4	~~3~~ 3	~~4~~ 2	~~5~~ 1
9.	The behavior of special-needs students will set a bad example for the other students.	1	2	3	4	5
10.	Isolation in a special class has a negative effect on the social and emotional development of a special-needs student.	~~1~~ 5	~~2~~ 4	~~3~~ 3	~~4~~ 2	~~5~~ 1
11.	The special-needs child will probably develop academic skills more rapidly in a special classroom than in a regular classroom.	1	2	3	4	5
12.	Most special-needs children do not make an adequate attempt to complete their assignments.	1	2	3	4	5
13.	Integration of special-needs children will require significant changes in regular classroom procedures.	1	2	3	4	5
14.	Most special-needs children are well behaved in the classroom.	~~1~~ 5	~~2~~ 4	~~3~~ 3	~~4~~ 2	~~5~~ 1

SA A U D SD

15. The contact regular class students have with mainstreamed students may be harmful. 1 2 3 4 5

16. Regular classroom teachers have sufficient training to teach children with special needs. ~~1 2 3 4 5~~ 5 4 3 2 1

17. Special-needs students will monopolize the teacher's time. 1 2 3 4 5

18. Mainstreaming special-needs children will promote their social independence. ~~1 2 3 4 5~~ 5 4 3 2 1

19. It is likely that a special-needs child will exhibit behavior problems in a regular classroom setting. 1 2 3 4 5

20. Diagnostic-prescriptive teaching is better done by resource-room or special teachers than by regular classroom teachers. 1 2 3 4 5

21. The integration of special-needs students can be beneficial for regular students. ~~1 2 3 4 5~~ 5 4 3 2 1

22. Special-needs children have to be told exactly what to do and how to do it. 1 2 3 4 5

23. Mainstreaming is likely to have a negative effect on the emotional development of the special-needs child. 1 2 3 4 5

24. Increased freedom in the classroom creates too much confusion. 1 2 3 4 5

25. The special-needs child will be socially isolated by regular classroom students. 1 2 3 4 5

26. Parents of the special-needs child present no greater problem for a classroom teacher than those of a normal child. ~~1 2 3 4 5~~ 5 4 3 2 1

27. Integration of special-needs children will necessitate extensive retraining of regular reachers. 1 2 3 4 5

28. Special-needs students should be given every opportunity to function in the regular classroom setting, where possible. ~~1 2 3 4 5~~ 5 4 3 2 1

29. Special-needs children are likely to create confusion in the regular classroom. 1 2 3 4 5

30. The presence of special-needs students will promote the acceptance of differences on the part of regular students. 5 4 3 2 1 ~~1 2 3 4 5~~

From Larrivee, B., & Cook, L. (1979). Mainstreaming: A study of the variables affecting teacher attitude. Journal of Special Education, 13 (3), 315-324.

Play Ratings

Scoring the "Play Rating"

SIMVD2
11/6/88
WL

(1) Sort the response sheets by student name as the names appear on the master class list (Lacking a master class list, sort the sheets alphabetically by Last name / first name). Keep a given class separate from other classes; i.e., sort within a class.

(2) Sort the pile created in (1) into two piles - one of responses by females, the other pile of responses by males. Retain the master list or alphabetical order in each subpile.

(3) Staple the subpile of females together. Staple the subpile of boys together - separate from females.

(4) Note: (a) A given student should not have rated her/himself (ensure the respondent's name on the list is crossed out)

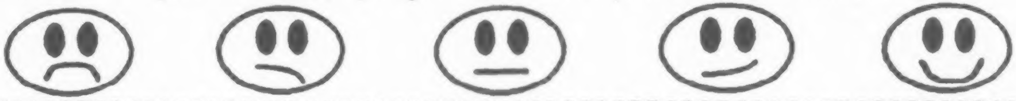
(b) There should be no sheet for students who have not had parental permission to be in the study

(5) For the first student -- sum the item scores by say males regarding this student. Count the number of (males) who rated this student. On a "summary sheet" write the sum (Σx), the number of raters (males) (n), and the mean score per rater ($\bar{x}$). Do this for each student under each rater column.

"Play Rating" Sociometric

Name ______________________________

How much do you like to play with this person at school?



1	2	3	4	5
Don't like to				Like to a lot

Examples:	Louise Blue	1	2	3	4	5
	Russel Grey	1	2	3	4	5

1.	1 2 3 4 5	21.	1 2 3 4 5
2.	1 2 3 4 5	22.	1 2 3 4 5
3.	1 2 3 4 5	23.	1 2 3 4 5
4.	1 2 3 4 5	24.	1 2 3 4 5
5.	1 2 3 4 5	25.	1 2 3 4 5
6.	1 2 3 4 5	26.	1 2 3 4 5
7.	1 2 3 4 5	27.	1 2 3 4 5
8.	1 2 3 4 5	28.	1 2 3 4 5
9.	1 2 3 4 5	29.	1 2 3 4 5
10.	1 2 3 4 5	30.	1 2 3 4 5
11.	1 2 3 4 5	31.	1 2 3 4 5
12.	1 2 3 4 5	32.	1 2 3 4 5
13.	1 2 3 4 5	33.	1 2 3 4 5
14.	1 2 3 4 5	34.	1 2 3 4 5
15.	1 2 3 4 5	35.	1 2 3 4 5
16.	1 2 3 4 5	36.	1 2 3 4 5
17.	1 2 3 4 5	37.	1 2 3 4 5
18.	1 2 3 4 5	38.	1 2 3 4 5
19.	1 2 3 4 5	39.	1 2 3 4 5
20.	1 2 3 4 5	40.	1 2 3 4 5

Totals in this class $\left\{ \begin{array}{l} n_{girls} = 5 \\ n_{boys} = 7 \end{array} \right\} N = 12$

SUMMARY - Play Rating

11/6/88
WL

Gender		Rated by males			Rated by females		
		Σx	n	$\bar{x}$	Σx	n	$\bar{x}$
G	1. Student One	17	7	2.42857	13	4	3.2500
B	2. Student Two	18	6	3.0000	15	5	3.0000
G	3. Student Three	15	7	2.1428	18	4	4.5000
G	4. Student Four	12	7	1.7143	19	4	4.7500
B	5. Student Five	17	6	2.8333	15	5	3.0000
B	6. Student Six	16	6	2.6667	13	5	2.6000
G	7. Student Seven	12	7	3.0000	12	4	3.0000
B	8. Student Eight	14	7	2.0000	14	5	2.8000
G	9. Student Nine	12	7	3.0000	18	4	4.5000
B	10. Student Ten	17	6	2.8333	16	4	4.0000
B	11. Student Eleven	16	6	2.6667	20	5	4.0000
B	12. Student Twelve	19	6	3.1667	13	5	2.6000
~~G~~	~~13. Student Thirteen~~						
	14.						
	15.						
	16.						
	17.						
	18.						
	19.						
	20.						
	21.						
	22.						
	23.						
	24.						
	25.						
	26.						
	27.						
	28.						
	29.						
	30.						
	31.						
	32.						
	33.						
	34.						
	35.						
	36.						
	37.						
	38.						
	39.						
	40.						

1- All females can rate each male, though a given female May choose not to - see Student Ten (under females) ($n = 4$) (and vice versa)

2- Student Eight did not have permission To rate other students, his $n = 7$ under males - he has no sheet in the male subpile.

3- There are 5 sheets in the female subpile; only 6 in the male pile

4- Carry out division to the fourth place beyond the decimal, except when the 4th place is a "5" - then report the 6th place.

Teacher Name: [redacted]
School: [redacted]

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1/04/89

SIMVD I + 2

PROCEDURES FOR SCORING THE FRIENDSHIP NOMINATIONS

①

NOT for SIMVD1 data †

① Put student response sheets (for a given *testing* *period* and for a given *teacher*) in alphabetical order.

② Separate response sheets by gender -- one pile of response sheets *by* females, the other *by* males. (see Gender lists as necessary).

not SIMVD1 → Retain alphabetical order (staple each pile)

for 1988-89 l children are targets."

③ Write the names and ID numbers of the "*target*" students on a nominations summary form - in the order they appear on the master ID list.

④ Choose the "female" pile for this class. Page number these response forms in the upper right hand corner -- 1, 2, 3, etc.

⑤ Write "F" in the "Rater Sex" blank.

⑥ Write the testing period at the top of the first Nominations Summary Form, e.g., "F.Nom 1" (for the first administration in SIMVD1)

* (see last page footnote)

* ⑦ For the first target student

ⓐ Look for her/his name on each of the response forms

ⓑ If respondent #1 (sheet 1) did not rate this child as most (positive) or least (negative), put a "–" in row 1 under the target students' name.

ⓒ If respondent #1 rated this child as "most like to play with", record a "P" in row 1 under the target students' name

ⓓ If ... "least ...", record an "N" ...

ⓔ Go to sheet 2, then 3, etc., repeat ⓐ-ⓓ in the corresponding row.

* ⑧ Repeat procedure ⑦ for each target child

*NOTE : The only exception to these procedures is that a student cannot rate her/himself. Therefore, if/when you come across a response sheet by the target student, write her/his name (in the row corresponding to her/his response sheet number) in place of a P, N, or –.

[Some students have rated themselves – that is not accepted as a response]

[Note that, if a student is "absent" (meaning out-for-the-day; transferred out of class; gone to the bathroom; whatever), then a responce sheet will not appear in the pile]

⑨ For the 1st target child, COUNT the number of respondents (remember, this does not include the target child's name).

⑩ Enter this number in row "n" at the bottom of the Nom. Summary Form.

⑪ Count the number of "P"s; enter in the "np" row, Target's column.

⑫ Count the number of "N"s; enter in the "nn" row, target's column.

⑬ Divide the number of "Ps" by "N" to get "%P"; record the number as a decimal fraction with a zero in the ones' place. For example: 0.0352 "(take the division to 4 places, we'll round as it is entered into the computer data base.

(Note: In several cases a student has received all "Ps"; ie, s/he got 100% "most like to play with." This is coded 1.000 for data entry)

⑭ Repeat step ⑬ for "%N" (negatives)

⑮ Repeat procedures ⑦-⑭ for each target child.

☆ NOTE: A) If a child fails to fill in a blank, we must ignore its effect on "N"-size. There is no way to determine to who that missing information should apply.

B) If a student selects too many for "most" or "least" record only for the top 3 listed in each category. ("most" & "least")

Friendship Nomination

Name: ____________________

Teacher Name: ____________________
School: ____________________

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.
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30.
31.
32.
33.
34.
35.
36.
37.
38.
39.
40.

I most like to play with:

1. ____________________

2. ____________________

3. ____________________

I least like to play with:

1. ____________________

2. ____________________

3. ____________________

$n_{females} = 5$
$n_{males} = 7$ } N=12

Friendship Nomination Summary

	Rated in the top three by males			Bottom three by males			Top three by females			Bottom three by females		
	Tally	n	Score	Tally	n	Score	Tally	n	score	Tally	n	score
G 1. Student One	/// =3	7	0.42857	=0	7	0.0000		4	0.0000	/	4	0.2500
B 2. Student Two	=0	6	0.0000	//	6	0.3333	///	5	0.6000		5	0.000
G 3. Student Three	/ =1	7	0.1428	/	7	•		4		/	4	•
G 4. Student Four	/ =1	7	0.1428	///	7	•	/	4			4	•
B 5. Student Five	// :	6	0.3333	/	6	•		5		/	5	•
B 6. Student Six	:	6	•		6		/	•			•	
G 7. Student Seven	///	7	•	/	7			•		///	•	
erm B 8. Student Eight	///	7	• etc.		7		//	•			•	
G 9. Student Nine	/	7			7		///			/		
B 10. Student Ten		6			6					𝍸		
B 11. Student Eleven	//	6		//	6		//			/		
B 12. Student Twelve	/	6			6		/					
~~G 13. Student Thirteen~~				/		disregard						
14.												
15.												
16.												
17.												
18.												
19.												
20.												
21.												
22.												
23.												
24.												
25.												
26.												
27.												
28.												
29.												
30.												
31.												
32.												
33.												
34.												
35.												
36.												
37.												
38.												
39.												
40.												

Each of these is the mean score per potential rater.

Teacher Name: ______________
School: ______________

Self-perception

1987-88

SCORING

SELF PERCEPTION PARTS 1 & 2

Part 1

① Score each item to which the student responded 0 = no 1 = "sort of"; "yes & no"; etc.
2 = yes

② total the item scored (possible total = ~~33~~ 22)

③ divide the total by $\overset{2}{3}$ times the number of items responded to.

$$\frac{22}{22} = 1.00$$

Part 2

① Score each item to which the student responded 1, 2, or 3 (as appropriate)

② sum the responce scores *(possible total 27)

③ divide by three times the number of items responded.

$$\frac{27}{27} = 1.00$$

(* item 10 was dropped)

Self Perceptions in Math

Name	____________________	Teacher	____________________
Date	____________________	School	____________________

Part 1

1. Do you like doing math?

2. In math, do you think you are smart?

3. In math, do you think you are good at figuring out problems?

4. Are you good at solving problems?

5. Do you like solving problems on your own?

6. In math, does your teacher think you are smart?

7. Do you know a lot about math?

8. In math, do your friends think you are smart?

9. Do you think math is fun?

10. Do you like deciding which activity to do at math class?

11. Do you like to do things without being told in math?

1988-89

SDQ-I

ADMINISTRATION AND SCORING INSTRUCTIONS

Administration Instructions

The following procedures are described for group administration; however, the procedures for individual administration are essentially the same.

- o Tell the students that their responses will be kept confidential and will not be made public. It is the responsibility of the examiner to honor this promise. If some aspect of this assurance is not applicable, it should be omitted, but these special circumstances should be noted. These circumstances may affect student responses.

- o Give a copy of the SDQ-I Questionnaire and a pencil with an eraser to each student. Help the students complete the identifying and background information at the top of the front page. Make sure that none of the students opens the Questionnaire until instructed to do so.

- o Ask the students to listen and follow along while you read aloud the instructions on the front page. Do not allow questions until after you have read the first sample item. Students are often puzzled at the end of the second paragraph but this puzzlement usually clears up after the examples are given and explained. It may be useful to hold up the instrument when reading the third paragraph and to point to the five boxes and headings before reading the material in parentheses after Example 1. Briefly pause after reading the instructions for Example 3 to allow students to mark their answers. Very few students have problems arriving at an answer to Example 3 and most understand how to mark their answer. However, questions will not be allowed once administration of the test begins, so answer all questions now, and make sure the students understand how to respond.

- o After all students have responded to Example 3, be sure that they do not turn the page until after you have read the next paragraph aloud. After you read the sentence "Do not leave out any of the sentences," add the following statement:

  WE WILL BE GOING QUITE FAST, AND YOU WILL HAVE TO MARK YOUR ANSWER IMMEDIATELY. THEN LISTEN TO THE NEXT SENTENCE. IF YOU FALL BEHIND, LEAVE OUT THE SENTENCES YOU HAVE NOT DONE. LISTEN TO THE SENTENCE I AM READING AND ANSWER THAT ONE. I WILL ALLOW YOU TIME AT THE END TO GO BACK TO ANY SENTENCES THAT YOU HAVE LEFT OUT.

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- When you are ready to begin, say, PLEASE DO NOT TALK. TURN OVER THE PAGE AND BEGIN. Once you have started, be sure to stop any talking, commenting, and deliberate or unconscious vocalization.

- After the students have turned the page, begin reading the sentences in a clear, loud voice. Read the sentence number before the start of each sentence. The sentences should be read at a fairly rapid and steady pace (approximately eight sentences per minute). Read the sentence twice without any pause. Then pause briefly and begin reading the next sentence. Students may be surprised at how fast you are reading the sentences, but they will quickly keep pace. Do not stop to answer any questions once you have begun reading the sentences.

- After you have completed reading all the sentences, say, NOW I WILL GIVE YOU A MINUTE OR TWO TO GO BACK TO ANY SENTENCES WHICH YOU LEFT OUT. BE SURE YOU HAVE ONE, AND ONLY ONE, ANSWER FOR EACH SENTENCE. PLEASE DO THIS NOW. WHEN YOU HAVE COMPLETED ALL THE SENTENCES, PUT YOUR PAPER FACE UP ON YOUR DESK AND WAIT QUIETLY FOR THE REST TO FINISH. IF THERE ARE ANY QUESTIONS ABOUT COMPLETING THE SENTENCES HOLD UP YOUR HAND, AND I WILL COME TO YOU.

- At this time if there are any questions, go to the individual student. If a student has trouble understanding a few words or expressions, paraphrase the expression as best you can without changing the meaning of the sentence. Ask the student to answer it as best he or she can. If the student has trouble with a number of words or expressions or has another problem which cannot be quickly and easily rectified, simply indicate the problem on the front of the first page and thank the student.

Although problems in administering the SDQ-I are rare, several potential problems and solutions are presented below to assist the user.

If a student interrupts you during the administration of the items to ask the meaning of a word or the interpretation of an item, ask the student to wait until you have finished reading all the sentences. The student should be encouraged to continue with the other items and leave the problem item until the end.

It is also possible that a student may mistakenly mark the answer to one or more items in the wrong place on the Questionnaire. The layout of the SDQ-I makes this unlikely, but if this happens, simply tell the student to cross out the incorrect response and substitute the correct response. If this has occurred for a large number of responses, it may be necessary to transfer the correct responses to a new Questionnaire.

Finally, there may be a few students who do not keep pace with the administration, no matter how often they are encouraged to do so. If they persist after several reminders, it is best to allow them to proceed at their own pace. Allow such students time to complete the SDQ-I after all the sentences have been read aloud, and check to see that they have had no problems. Similarly, there may be students who want to go ahead of the administration, particularly if the pace of administration is not reasonably fast. Once again, encourage them to stay with the group, but allow them to proceed at their own pace if they persist.

SCORING INSTRUCTIONS

Responses to the SDQ-I may be scored conveniently using the SDQ-I Scoring Worksheet, attached. The worksheet provides for the calculation of individual scale raw scores, total raw scores (Nonacademic, Academic, and Total Self), and optional control scores. Calculation of each of the scores is described below.

Individual Scale Raw Scores

Complete the identifying information at the top of the SDQ-I Scoring and worksheet by copying the information from the front of the child's SDQ-I Questionnaire.

First, score the individual scales. In the first section of the worksheet, under the name of each scale there is a column of item numbers that comprise the scale, blanks in which the child's item scores should be recorded, and item means (in parentheses). Using the child's Questionnaire, find the child's responses for items 3, 10, 24, and so on down the column for the Physical Abilities Scale. Convert the child's response to each item into one of the following scores: False = 1, Mostly False = 2, Sometimes False/Sometimes True = 3, Mostly True = 4, and True = 5. Write the appropriate score for each item in the blank after the item number. Repeat this procedure for the seven remaining individual scales and record the appropriate score for each item in the blanks provided after the item numbers.

Then simply sum the scores in each column to arrive at the individual scale raw scores. For example, sum the scores for Items 3, 10, 24, 32, 40, 48, 56, and 64 to arrive at the raw score for the Physical Abilities Scale. Write the sum for each scale in the blanks labeled "Individual Raw Scores" that appear below each column of item numbers.

If on the Questionnaire, the child omits three or fewer responses, the mean response for the missing item should be substituted for the missing item score. Item means are listed in parentheses following the blanks next to their respective item numbers on the worksheet. If there are four or more responses missing, the responses either should not be scored at all or should be interpreted cautiously. When a scale contains an item mean, the sum of the items will not be a whole number; therefore, the sum should be rounded to the next whole number.

Users are cautioned to make certain that each item has been translated into the correct score and has been written in the blank next to the correct item number. In addition, as each individual scale score is summed, it should be checked by recalculating it to avoid errors in addition. Also, note that for each scale the lowest possible raw score is 8, and the highest possible raw score is 40.

Total Scores

The individual scale raw scores are used to calculate the Total Academic, Total Nonacademic, and Total Self raw scores.

Four of the individual scale raw scores (Physical Abilities, Physical Appearance, Peer Relations, and Parent Relations) are used to calculate the Total Nonacademic score. Three of the individual scale raw scores (Reading, Math, and General-School) are used to calculate the Total Academic score. These two composite scores are used in turn to compute the Total Self score.

To calculate the Total Nonacademic score, copy the raw scores for the Physical Abilities, Physical Appearance, Peer Relations, and Parent Relations scales in the appropriate blanks in the section labeled "Total Nonacademic" on the Score Calculation and Summary page. Then sum the four raw scores and write the total in the space labeled "Total." Finally divide the total by four and write the result in the space labeled "Total Nonacademic Raw Score."

To calculate the Total Academic score, copy the raw scores for the Reading, Math, and General-School scales into the appropriate blanks in the section labeled "Total Academic." Then sum the three raw scores and write the total in the space labeled "Total." Finally, divide the total by three and write the result in the space labeled "Total Academic Raw Score."

Finally, calculate the Total Self score. To do so, copy the Total Nonacademic and the Total Academic raw scores into the appropriate blanks in the section labeled "Total Self." Then sum the two composite scores and write the total in the space labeled "Total." Divide the total by two and write the result in the space labeled "Total Self Raw Score."

Again, users are cautioned to double check these calculations to avoid errors in addition or division. The possible range of scores can also serve as a check. For each total score (Total Nonacademic, Total Academic, and Total Self), the lowest possible raw score is 8 and the highest possible raw score is 40.

SAMPLE

SELF DESCRIPTION QUESTIONNAIRE - I

Name Student One Boy • Girl • Grade/Year •

Age • School • Teacher •

This is a chance to look at yourself. It is not a test. There are no right answers and everyone will have different answers. Be sure that your answers show how you feel about yourself. PLEASE DO NOT TALK ABOUT YOUR ANSWERS WITH ANYONE ELSE. We will keep your answers private and not show them to anyone.

When you are ready to begin, please read each sentence and decide your answer. (You may read quietly to yourself as I read aloud). There are five possible answers for each question -- "True", "False", and three answers in between. There are five boxes next to each sentence, one for each of the answers. The answers are written at the top of the boxes. Choose your answer to a sentence and put a tick (✓) in the box under the answer you choose. DO NOT say your answer out loud or talk about it with anyone else.

Before you start there are three examples below. Somebody named Bob has already answered two of these sentences to show you how to do it. In the third one you must choose your own answer and put in your own tick (✓).

n= 8	A- 30	3.7500
n= 7	R- 17	2.42857
n= 6	M- 23	3.8333
n= 8	P- 18	2.2500

	FALSE	MOSTLY FALSE	SOMETIMES FALSE SOMETIMES TRUE	MOSTLY TRUE	TRUE	
1. I like to read comic books. . . . . 1.	☐	☐	☐	☐	☑	1.

(Bob put a tick in the box under the answer "TRUE". This means that he really likes to read comic books. If Bob did not like to read comic books very much, he would have answered "FALSE" or "MOSTLY FALSE".)

	FALSE	MOSTLY FALSE	SOMETIMES FALSE SOMETIMES TRUE	MOSTLY TRUE	TRUE	
2. In general, I am neat and tidy. . . . . 2.	☐	☐	☑	☐	☐	2.

(Bob answered "SOMETIMES FALSE, SOMETIMES TRUE" because he is not very neat, but his not very messy either.)

	FALSE	MOSTLY FALSE	SOMETIMES FALSE SOMETIMES TRUE	MOSTLY TRUE	TRUE	
3. I like to watch T. V. . . . . 3.	☐	☐	☐	☑	☐	3.

(For this sentence you have to choose the answer that is best for you. First you must decide if the sentence is "TRUE" of "FALSE" or somewhere in between. If you really like to watch T.V. a lot you would answer "TRUE" by putting a tick in the last box. If you hate watching T.V. you would answer "FALSE" by putting a tick in the first box. If your answer is somewhere in between then you would choose one of the other three boxes.)

If you want to change an answer you have marked, you should cross out the tick and put a new tick in another box on the same line. For all the sentences be sure that your tick is on the same line as the sentence you are answering. You should have one answer and only one answer for each sentence. Do not leave out any of the sentences.

If you have any questions, put up your hand. Turn over the page and begin. Once you have started, PLEASE DO NOT TALK.

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			FALSE	MOSTLY FALSE	SOME-TIMES FALSE SOME-TIMES TRUE	MOSTLY TRUE	TRUE	
✓ 2 1. I'm good at all SCHOOL SUBJECTS	1.		☐	☑	☐	☐	☐	1.
✓ 3 2. I get good marks in READING	2.		☐	☐	☑	☐	☐	2.
[redacted] I hate MATHEMATICS	3.		☐	☐	☐	☑	☐	3.
✓ 1 4. I have lots of friends	4.		☑	☐	☐	☐	☐	4.
✓ 4 5. I enjoy doing work in all SCHOOL SUBJECTS	5.		☐	☐	☐	☑	☐	5.
✓ 3 6. I like READING	6.		☐	☐	☑	☐	☐	6.
✓4 7. Work in MATHEMATICS is easy for me	7.		☐	☐	☐	☑	☐	7.
✓ 2 8. I make friends easily	8.		☐	☑	☐	☐	☐	8.
✓ 5 9. I get good marks in all SCHOOL SUBJECTS	9.		☐	☐	☐	☐	☑	9.
✓2 10. I'm good at READING	10.		☐	☑	☐	☐	☐	10.
⑪ I look forward to MATHEMATICS	11.		☐	☐	☑	☑	☐	11.
[redacted] I hate all SCHOOL SUBJECTS	12.		☐	☐	☐	☐	☐	12.
✓2 13. I am interested in READING	13.		☐	☑	☐	☐	☐	13.
✓4 14. I get good marks in MATHEMATICS	14.		☐	☐	☐	☑	☐	14.
✓1 15. I get along with other kids easily	15.		☑	☐	☐	☐	☐	15.
✓4 16. I learn things quickly in all SCHOOL SUBJECTS.	16.		☐	☐	☐	☑	☐	16.
✓5 17. I am interested in MATHEMATICS	17.		☐	☐	☐	☐	☑	17.
✓2 18. I am easy to like	18.		☐	☑	☐	☐	☐	18.
✓4 19. I am interested in all SCHOOL SUBJECTS	19.		☐	☐	☐	☑	☐	19.
✓2 20. I enjoy doing work in READING	20.		☐	☑	☐	☐	☐	20.
✓3 21. I learn things quickly in MATHEMATICS	21.		☐	☐	☑	☐	☐	21.
✓4 22. Other kids want me to be their friend	22.		☐	☐	☐	☑	☐	22.
✓2 23. Work in READING is easy for me	23.		☐	☑	☐	☐	☐	23.
✓5 24. I like MATHEMATICS	24.		☐	☐	☐	☐	☑	24.

				FALSE	MOSTLY FALSE	SOME-TIMES FALSE SOME-TIMES TRUE	MOSTLY TRUE	TRUE	
✓ 1	25.	I have more friends than most other kids. . .	25.	☑	☐	☐	☐	☐	25.
✓ 3	26.	I look forward to all SCHOOL SUBJECTS. . . .	26.	☐	☐	☑	☐	☐	26.
	(27)	I look forward to READING.	27.	☑	☐	☐	☐	☑	27.
✓ 2	28.	I'm good at MATHEMATICS.	28.	☐	☑	☐	☐	☐	28.
✓ 4	29.	I am popular with kids of my own age.	29.	☐	☐	☐	☑	☐	29.
✓ 5	30.	Work in all SCHOOL SUBJECTS is easy for me	30.	☐	☐	☐	☐	☑	30.
[redacted]		hate READING.	31.	☑	☐	☐	☐	☐	31.
	(32)	I enjoy doing work in MATHEMATICS.	32.	☐	☐	☐	☐	☐	32.
✓ 3	33.	Most other kids like me.	33.	☐	☐	☑	☐	☐	33.
✓ 3	34.	I like all SCHOOL SUBJECTS.	34.	☐	☐	☑	☐	☐	34.
✓ 3	35.	I learn things quickly in READING.	35.	☐	☐	☑	☐	☐	35.

Observations

Observation guidelines

General Guidelines for Observers

Before you go into classrooms for the first time, you need to be briefed on several important points concerning your behavior while in the schools. You should read the information herein carefully. Adhering to these procedures not only helps insure good data quality, but also helps you gain and maintain cooperation and good will from school personnel.

1. You need to understand that the data you collect should be a representative sample of normal classroom functioning. Anything that interferes with classroom activity (such as the presence of an observer) is apt to bias the data. Therefore, you should try to minimize the effects of your presence in the classroom.

The most important thing for you to remember is to remain as inconspicuous as possible. You should sit where you will not hamper or disrupt classroom activities. Try to sit where you are able to see and hear what goes on in the room, but at the same time place yourself with discretion. It is important that you be able to see student faces. Sitting up front by the teacher's desk may give you an excellent view of the teacher and the students, but would be very awkward; you are likely to become the center of attention, and may be in the way of the teacher and students. Try to sit at the side of the room at an empty desk or at a table.

Remain seated; do not stand up or walk around the room. Avoid making the students or teachers feel self-conscious by craning your neck to see or by staring at them. Nothing is more apt to inhabit the behavior or the teachers and students than the feeling that they are being "watched". Of course, you should never eat, smoke cigarettes, or engage in any other inappropriate behavior while you are in the classroom. Anything that you do which draws attention to yourself will disrupt the normal functioning of the class and should be avoided.

2. Be in the classroom before the bell rings or the lesson has officially begun. Arriving late and walking in during the lesson invariably disrupts the on-going activity to some extent. Also avoid leaving the class early, not so much because it will bias data collection, but because it shows a lack of consideration for the teacher.

3. Also consider appropriate dress. Remain inconspicuous. Loud, sloppy, or revealing clothing not only draws attention, but may also offend some teachers or principals. Clothing should be clean, neat, and fairly conservative. Since dress standards vary widely, a good rule of thumb is to dress as the teachers in the school do.

4. Another important point involves your relationship with teachers. Always try to be friendly and considerate toward teachers. Introduce yourself to teachers the first time you observe in a class, and when you leave, thank them for their cooperation. When you return many times to the same class, teachers will get accustomed to your presence, so a smile or wave when entering or leaving is all that will be necessary to maintain a professional relationship. An overly friendly relationship between the teacher and coder could cause a change in the teacher's normal behavior in the classroom. Never talk to the teacher about other teachers or students. All data collection and coder observations are confidential.

Teachers should be notified well before when they are to be observed. Give a weekly schedule to each teacher. Also notify teachers well ahead of time regarding changes in the schedule. Take the initiative to call the teacher to ensure that your next observation will be as scheduled. Do not observe the class during tests and special, non-math activities. Request a new seating chart from the teacher each time s/he changes student seating. Provide your telephone number to the teachers you'll be observing, and ask for theirs - keep your lines of communication regarding scheduling open.

5. Minimize personal interactions with students. Do not try to make friends with the students or engage them in conversation. Many students are curious as to why coders are there and what they are doing. Always respond to direct student questions, but in a way that does not encourage further contact. A brief response to students such as "I am here to observe," usually will satisfy them. After a while, students usually become accustomed to your presence and pay little attention to you.

6. Avoid being drawn into class activities by the teacher or students. DO not help students with their school work or in any way assume a teaching role. If a teacher attempts to include you in classroom activities, or to put you in charge of the class while s/he leaves the room, speak to the teacher as soon as possible, explain that your helping the students is incompatible with good data collection.

7. Teachers may question you about the observational system and the goals of the research project. Some teachers ask questions simply out of curiosity; others do so out of anxiety, or the fear that they are being "evaluated". Inform the teachers that they should direct all questions to the project direction. Let them know that you are not aware of the specific research goals. Do not discuss the observation system of coding sheets with teachers or students. Be polite, but firm in directing them to the project directors for answers to their questions.

8. One of the primary concerns of teachers and principals regarding research projects in their school is that data collected will be kept strictly confidential. To ensure that this is the case, mind several "don'ts": 1. don't talk to any teacher or principal about other teachers or students. 2. don't talk about teachers or their students with other observers, and 3. don't talk

about teachers, students, or the research project outside of work-related discussions with project staff.

9. Take these conventions into class with you during the training period in case you need to refer to them. If a novel type of interaction or event occurs, note it on your coding sheet, describe it on the back of the sheet, and discuss it later during a project staff meeting.

During actual data collection, any irregularities or special problems encountered while coding should also be noted and discussed later with the project coordinators. If these special situations are found to affect the data quality, we will update this set of conventions.

10. Ensure that you take time to tidy up your coding sheets after the math lesson (either in the classroom or in your car; please do the tidying up ASAP after the math lesson). Always check your sheets before turning them in to your coordinator. Complete all identification information, such as teacher, page number, date, etc. Also, scan the data for incomplete coding or mistakes. This is very important; extra effort on your part will save time during data tabulation, and may prevent the loss of valuable information.

11. Always take along plenty of coding sheets when collecting data. Use a pencil, not pen, while coding, so that you can correct mistakes easily.

12. Keep your site coordinator/scheduler informed of your personal schedule weekly. If changes occur - please call the coordinator and, if necessary, other observers and the teacher.

13. Let the site coordinator and Ron or Bill know if a teacher is to be absent more than a day or two. We'll probably have to make adjustment in coding.

14. Encourage the teacher to use student first names, and last names for students with the same first names.

Teacher Child Dyadic Interaction Observation System

The Observation System was adapted from a system developed by Jere E. Brophy and Thomas L. Good in 1969 while they were at the Research and Development Center for Teacher Education, University of Texas at Austin.

Interaction is defined as:

1. occurring between a teacher and a student or group of students (not between/among students)

2. A "complete" interaction can be coded only after

   a. P, B, A, or V, N; has changed (a change in +,o,- may or may not be the basis for a "complete" interaction)

OR

   b. the student with whom the teacher is interacting changes

OR

   c. the content or thought of the interaction has changed (e.g., from the problem #1 to problem #2 in the workbook; even if the next interaction is with the same student).

AND

   d. a student(s) has acted or responded

AND

   e. the teacher has responded to a student(s).

An "interaction" can be initiated by: 1. a student(s), 2. the teacher, or 3. an outside actor, object, or event (e.g. the principal enters the room and speaks to the children). We have codes for 1 and 2; 3 can be described briefly in the "comments" column.

The observation sheet has six columns a. group prompt, b. type, c. volunteer/nominated, d. directed, e. quality and f. comments. A breakdown of the categories and definition follows.

I. GROUP PROMPT

The "G" is circled when interaction is between the teacher and the entire class. That is all or most of the students interact with the teacher.

II. TYPE

1. Procedural (P)--A procedural interaction has to do with housekeeping chores, e.g., seeking permission to go to the restroom, passing out pencils, and reporting nonacademic assignments.

2. Behavioral (B)--A behavioral interaction refers to the student's social behavior i.e., misbehavior and good behavior.

3. Academic (A)--An academic interaction is one that is math content-related. It includes those contacts that have to do with the instructional presentations and student's completion of seat work, homework, or other academic assignments.

There are certainly gray areas between/among categories (e.g., P, B, A). Procedural and behavioral interactions can occur within academic work. (See below).

Turn to p. 5 or your workbook ... - academic

Answer problem 1, John... - academic

Fred, go sharpen your pencil... - procedural

How many of you missed number 4...- academic

Let's move on to language arts....- do not code, this
begins a "non-math" lesson
(Note: the above are only teacher prompts which let to interactions . . .)

III. VOLUNTEER/NOMINATED STUDENT ACTION

1. Volunteer (V)--A volunteer action is initiated by student. Code "V" anytime a student(s)
   a. approaches the teacher

b. raises her/his hand - whether as an initiation of an interaction or in response to a teacher question or comment.

2. Nominated (N)--A nominated interaction is initiated by teacher. The teacher calls on a student(s) who has not volunteered.

IV. DIRECTED TO

When an individual student or "small" group of students interacts with the teacher, write the name(s) of the student(s) in the "Directed to" column. If the small group(s) is located in specific areas of the classroom, it may help to circle the area on your seating chart (put a letter--"A", "B", etc,--in the circle and a corresponding letter on the appropriate coding line), for reference when you are tidying up your code sheet after the math lesson. As you tidy up, fill in the names.

When a student initiates the interaction, indicate such by "T by Becky" in the "Directed to" column.

V. QUALITY

1. POSITIVE (+)--A positive teacher response refers to one that is posed in an accepting manner. The interaction will probably involve words, intonation, or action which indicates praise.

2. Neutral (o)--A neutral teacher response refers to one that is posed in a matter-of-fact manner.

3. Negative (-)--A negative teacher response refers to one that is posed in a critical manner.

Since we cannot know how a given child will perceive a response by the teacher, code "quality" as perceived by an "average" child in this classroom. When coding quality(+,o,-) be sensitive to the words, intonation, body language, and the context of the interaction. When coding a machine interaction (M) you do not need to code quality (+,o,-). (see sample sheets)

VI. COMMENTS

Your notes in the comment column can be critical to reliability comparisons. Put descriptive comments or partial quotations in parentheses and line out if no interaction occurred, e.g.,

-----------------------------(Tcirculating)

Other descriptive comments aside from interactions might include: (M instruction) (T directions) (fire drill) (10:22 a.m.) (T observing from disk) NOTE: These types of "descriptions" require no coding of columns I-V.

"C" under "comments" indicates a choral response by all or most of the students.

Verbal comments by the teacher can be abbreviated, e.g. "Cor" can be used for "correct", Rt for "right", Ok, etc, (note abbreviations and what they stand for at the top of the comments column) >

Put "M" or "T" in the "comments" column when the machine medium or teacher reacted to the student(s).

Use "NC" in the comments column, if the teacher makes no verbal comment.

Separate A (= aide) X from T (= teacher) codes when an aide and teacher are equally "in charge".

Response types requested by the Mastering Fractions program or by the teacher will probably be one of the following: WB - work in your workbook or LP - work on lined paper. The teacher or disc program may also ask for a choral response - C, or the teacher may request a response from a student or small group of students.

NOTE: WP, LP, and C (i.e., what the students do) in the "comments" column. For example G, M, WB - the program tells the students to work problem 3). NOTE: student name(s) in the "Directed to" column.

DIRECTIONS

Complete the top section of the observation form before you enter the classroom (see sample coding sheets) >

The "start" and "stop" times are important for data analysis. Any time you have an opportunity to include a time, write it to the right of the comments column (see sample sheets).

Note, by name, on a coding sheet separate from your observation sheet, the names of students who are absent from the math lesson - whether because of illness, testing, pullout programs, discipline, early bus, or whatever; and why they are absent (if you can unobtrusively determine the information).

Use the bottom and back of the coding sheet for general comments of your own regarding...

a. problems you encountered.
b. general impressions of the math lesson

c. explanations of new types of interactions you encountered, and how you coded the interaction (this procedure is extremely important to ensure that we observers are coding consistently).
d. translation of information to a language other than English.
e. comments to you by the teacher

Classes may have "teacher aides" who are student teachers, older students, teacher aides, etc. Code the teacher "in charge", NOTE it if an aide also helps students in "comments", unless the responsibility is equally shared.

Code the teacher who is consistently "in charge" of the math class. Let Ron and Bill know if a student teacher or substitute teacher is in the class - note this fact on your coding sheet for the day.

Begin your coding at the first mention of the math lesson, this would normally be a procedural remark such as "Okay, let's take a look at your math homework." If you are coding with a fellow observer, communicate that you are beginning with a nod to each other.

As you observe, prioritize what you are looking for as follows. Record. . .

a. the child's name(s) and whether the interaction is "V" or "N"
b. whether the interaction is P, B, or A.
c. whether it is +, o, or -

NOTE: b. and c. usually require that the interaction be "complete" before they can be coded.

For all codes it is necessary that you wait until the teacher has made some response to code the quality column....

Therefore, you may begin coding an interaction event only to find that the interaction has evolved - This may spread your coding over several lines. If this occurs, group ({) and check ( ) those lines representing a single interaction. (see sample sheets)

If a lull occurs - code descriptive information in parentheses, e.g., (T-circulating), (10:25 a.m.), etc.

Complete your coding of an interaction only after the teacher has responded to a student(s)'s action.

Code an interaction only after the machine or teacher requests a response from the students and the M or T reacts.

Code an interaction as "T" or "M" depending on which entity responds to the student(s) response.

When the T or M begins to speak to the students, code G. At this point you may or may not have an "Interaction".

If the teacher interrupts the machine to initiate and complete an interaction, code as a "T"/student interaction.

If the teacher explains something, then the program asks for a response and completes the interaction, code as a "m"/student interaction.

When G is coded, "V" or "N" is necessary. Use "V" or "N" to code single or small group student actions (not choral actions).

When the teacher repeats the disc command and asks for a group/student response, then reacts to the response, Code: G, A, T, and do code the quality of teacher response.

NOTES:

1. Keep your visits in a given classroom random. That is, a given observer shouldn't go to the same classroom every Tuesday at 10:00 a.m. Of course, you are always observing math lessons which are non-test periods.

2. These observations are not teacher or student evaluations.

3. Code with another observer at least once per week to check and maintain interobserver agreements.

4. If a fellow observer cannot make an observation, communicate and cover!

5. If the teacher notes an error in the Mastering Fractions program, note it on your coding sheet - provide the disc side (1, 2, 3, 4, 5, or 6) and frame number. Press firmly with your pencil and write as neatly as you can, given the pace of the classroom action.

6. Don't change your coding when you do training and agreement (reliability) observations. Mark them in colored pen or pencil so that disagreements can be ironed out.

7. Go over your observation sheets after the math lesson to group multiple coding lines which actually constitute one interaction (see sample sheets).

CONVENTIONAL CODINGS AND EXAMPLES

If the prompt is narrative, code (for example)
G; A; ---;------; M. LP

If it results in an interaction, code (for example)
G; A; John; ±; "How many?"
or
G; A; ----; o; T, C

(See sample Sheets)

Code the following as a single interaction.

teacher to the class "What's 2+3"
(Students raise their respective hands)
(Teacher calls on John)
John "6?"
Teacher "Think about it."
John "Oh, 5!"

Code as:
G, A; John; ±; (Comment).

Example coding situations below appear on the code sheet on p. 13.

Presentation:

1. videodisc presents - no response requested (narrative; broadcast) -- no code.
2. videodisc asks for a choral response, students respond, disc says "yes".--G M C
3. *teacher presents - no response requested of student -- no code
4. teacher presents/questions, choral student response, the teacher responds "o.k." --G P,B, A, T +,o,- C
5. teacher presents/questions, identifies student, no response--code carefully - (teacher may go on to another student as a response to this child).
6. teacher presents/questions the class, choose from respondents, student responds --code PBA; N; student name; +o-; G; T, comment
7. teacher presents/questions the class, choose from respondents, student responds--code PBA; B; student name; +o-; G; T; comment

8. teacher interacts with a small group of students---G, Names, etc.

Checking Workbook

1. videodisc presents, calls for students to check workbook -- G M WB
2. teacher presents; calls for students to check papers --- G T LP
3. etc.

Checking lined paper work

1. videodisc presents; calls for students to check papers -- G M LP
2. teacher presents; calls for students to check papers -- G T LP
3. etc.

Child Initiated Action

1. student requests - teacher responds -- code PBA V T by student name +o-comment

VIDEOTAPED SAMPLE CODINGS:

Included is a set of coding sheets for the 23 min. videotape of a teacher using Mastering Fractions, Lesson 1: and for the 33 minute videotape of a teacher not using the disc on pp. 14 ff.

---

* Code the teacher who is "in charge" of the class.

CLASS ________ DATE __/__/__ START ______ ELAPSED ________

EVENT ______ OBSERVER ______ STOP ____ PAGE ____ OF ____

GROUP PROMPT	TYPE OF TEACHER PROMPT	VOLUNTEER/ NOMINATED	DIRECTED TO:	QUALITY OF TEACHER RESPONSE:	COMMENTS:
G	P B A	V N		+ 0 -	
G	P B A	V N		+ 0 -	
G	P B A	V N		+ 0 -	
G	P B A	V N		+ 0 -	
G	P B A	V N		+ 0 -	
G	P B A	V N		+ 0 -	
G	P B A	V N		+ 0 -	
G	P B A	V N		+ 0 -	
G	P B A	V N		+ 0 -	
G	P B A	V N		+ 0 -	
G	P B A	V N		+ 0 -	
G	P B A	V N		+ 0 -	
G	P B A	V N		+ 0 -	
G	P B A	V N		+ 0 -	
G	P B A	V N		+ 0 -	
G	P B A	V N		+ 0 -	
G	P B A	V N		+ 0 -	
G	P B A	V N		+ 0 -	
G	P B A	V N		+ 0 -	
G	P B A	V N		+ 0 -	
G	P B A	V N		+ 0 -	
G	P B A	V N		+ 0 -	
G	P B A	V N		+ 0 -	
G	P B A	V N		+ 0 -	
G	P B A	V N		+ 0 -	
G	P B A	V N		+ 0 -	
G	P B A	V N		+ 0 -	
G	P B A	V N		+ 0 -	
G	P B A	V N		+ 0 -	

Criterion-Referenced
Test

MF. CRT

Mastering Fractions Mastery Test

Start time ______
Finish time ______
Total time ______

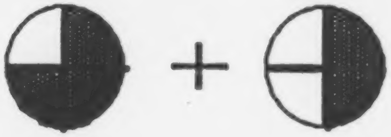
Name ______
Date ______

☐ Pretest
☐ Posttest

Teacher ______
School ______

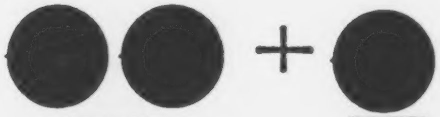
A. Write the fraction for each picture and the total.

1.



$\boxed{\frac{3}{4}} \quad \boxed{\frac{2}{4}} = \boxed{\frac{5}{4}}$

2.



$\boxed{\frac{2}{1}} \quad \boxed{\frac{1}{1}} = \boxed{\frac{3}{1}}$

B. Circle the correct answer.

1. $\frac{4}{5}$
more than one
equals one
[✓ less than one]

2. $\frac{5}{1}$
[✓ more than one]
equals one
less than one

3. $\frac{6}{6}$
more than one
[✓ equals one]
less than one

C. Multiply and write the answer.

1. $(2)\ \frac{3}{5} = \boxed{\frac{6}{5}}$

2. $\frac{3}{5} \times \frac{3}{1} = \boxed{\frac{9}{5}}$

3. $\frac{3}{4} \times \frac{4}{2} = \boxed{\frac{12}{8}}$

KEY

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D. Follow the directions for each part below.

a. Write the missing numbers.

1. $\frac{5}{6}\left(\frac{3}{3}\right) = \frac{\boxed{15}}{18}$

2. $\frac{\boxed{1}}{2}\left(\frac{6}{6}\right) = \frac{6}{12}$

3. $\frac{2}{3}\left(\frac{7}{7}\right) = \frac{\boxed{14}}{21}$

4. $\frac{4}{\boxed{5}}\left(\frac{4}{4}\right) = \frac{16}{20}$

b. Write the missing whole numbers.

1. $\frac{4}{4} = \boxed{1}$

2. $\boxed{7} = \frac{7}{1}$

3. $\boxed{200} = \frac{200}{1}$

c. Circle each fraction that equals 3.

1. [✓ $\frac{3}{1}$] 2. [✓ $\frac{12}{4}$] 3. $\frac{3}{9}$

d. Complete each equation.

1. $\frac{\frac{5}{8}}{\boxed{\frac{5}{8}}} = 1$

2. $\frac{\frac{2}{5}}{\boxed{1}} = \frac{2}{5}$

3. $1 = \frac{600}{\boxed{600}}$

e. Fill in the boxes.

1. $2 = \frac{\boxed{14}}{7}$

2. $\frac{\boxed{27}}{3} = 9$

3. $4 = \frac{\boxed{24}}{6}$

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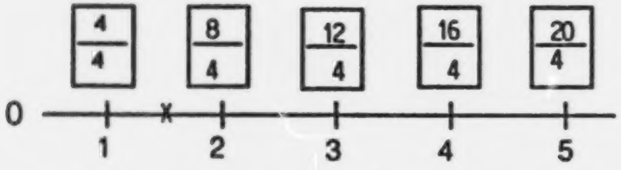
E. **Follow the directions for each of the number line problems.**

1.

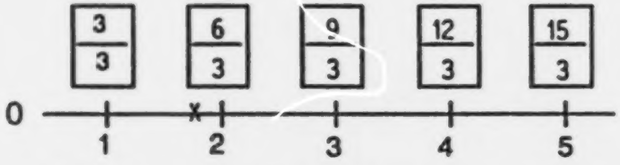


Fill in the boxes with the fractions for the whole numbers.

Put an X on the number line where the fraction $\frac{6}{4}$ should be

---

2.

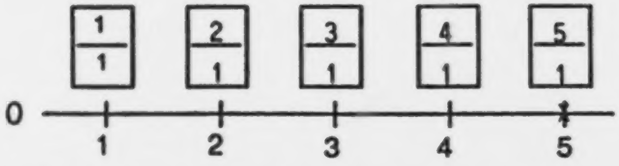


Fill in the boxes with the fractions for the whole numbers.

Put an X on the number line where the fraction $\frac{5}{3}$ should be

---

3.



Fill in the boxes with the fractions for the whole numbers.

Put an X on the number line where the fraction $\frac{5}{1}$ should be

F. **fill in the boxes with the correct number.**

1. Write the first common number for 9 and 7. 63
2. Write the first common number for 2, 10, and 4. 20
3. Write the first common number for 8 and 2. 8

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G. Follow the directions for each part below.

a. Write the first common number for the denominators.

1. $\frac{1}{2}$ $\frac{1}{4}$ $\frac{5}{6}$ $\boxed{12}$

2. $\frac{3}{4}$ $\frac{1}{8}$ $\boxed{8}$

3. $\frac{2}{5}$ $\frac{2}{7}$ $\boxed{35}$

b. Work each problem that can be worked the way it is written.

1.

$$\begin{array}{r} \frac{3}{4} \\ + \frac{5}{3} \\ \hline \boxed{\frac{\quad}{\quad}} \end{array} \qquad \begin{array}{r} \frac{7}{8} \\ - \frac{3}{8} \\ \hline \boxed{\frac{4}{8}} \end{array} \qquad \begin{array}{r} \frac{7}{4} \\ - \frac{7}{5} \\ \hline \boxed{\frac{\quad}{\quad}} \end{array}$$

c. Work each problem.

1. $\begin{array}{r} \frac{3}{4} \\ + 2 \\ \hline \end{array}$ $2\frac{3}{4}$ or $\frac{11}{4}$

2. $\begin{array}{r} 4 \\ - \frac{2}{3} \\ \hline \end{array}$ $3\frac{1}{3}$ or $\frac{10}{3}$

3. $\begin{array}{r} \frac{6}{5} \\ + 1 \\ \hline \end{array}$ $2\frac{1}{5}$ or $\frac{11}{5}$

*Note: or any equivalent fraction

d. Work each problem.

1. $\begin{array}{r} \frac{1}{3} \\ \frac{3}{4} \\ + \frac{1}{2} \\ \hline \end{array}$ $1\frac{3}{4}$ or $\frac{19}{12}$

2. $\begin{array}{r} 3 \\ \frac{1}{2} \\ + \frac{1}{4} \\ \hline \end{array}$ $3\frac{3}{4}$ or $\frac{15}{4}$

3. $\begin{array}{r} \frac{2}{5} \\ \frac{1}{2} \\ + \frac{3}{10} \\ \hline \end{array}$ $1\frac{1}{5}$ or $\frac{12}{10}$

*Note: or any equivalent fraction

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H. Follow the directions for each part below.

a. Write each fraction as a division problem, then write the mixed number that it equals.

1. $\frac{31}{3}$ $3\overline{)31}$ $10\frac{1}{3}$

2. $\frac{27}{10}$ $10\overline{)27}$ $2\frac{7}{10}$

3. $\frac{29}{4}$ $4\overline{)29}$ $7\frac{1}{4}$

b. Simplify these fractions.

1. $\frac{12}{28}$ $\frac{3}{7}$

2. $\frac{8}{10}$ $\frac{4}{5}$

3. $\frac{15}{40}$ $\frac{3}{8}$

I. Write each mixed number as a fraction.

1. $1\frac{3}{5}$ $\frac{8}{5}$

2. $7\frac{2}{3}$ $\frac{23}{3}$

3. $4\frac{1}{6}$ $\frac{25}{6}$

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J. **Work the problems.**

1. $\frac{4}{5} \div \frac{1}{4} = \boxed{\frac{16}{5}}$

2. $5 \div \frac{3}{7} = \boxed{\frac{35}{3}}$

3. $\frac{3}{7} \div \frac{3}{2} = \boxed{\frac{6}{21}}$

K. **Work each problems. Simplify each answer if you can.**
Write each answer as a mixed number if you can.

1. $3 - \frac{3}{4} = \frac{9}{4} = 2\frac{1}{4}$

2. $\frac{3}{8} \div \frac{1}{2} = \frac{3}{4}$

3. $\frac{5}{9} - \frac{1}{2} = \frac{1}{18}$

4. $4 \times 1\frac{5}{6} = \frac{44}{6} = 7\frac{1}{3}$

5. $2\frac{1}{3} + 1\frac{4}{5} = \frac{62}{15} = 4\frac{2}{15}$

6. $\frac{3}{4} + 1\frac{1}{2} + 2 = \frac{17}{4} = 4\frac{1}{4}$

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APPENDIX B

Spring Data

Table B1. Spring 1988 (Year 1), Play Ratings

Categories			Pretest Means	Posttest Means	ES
Treatment Groups	Student Type	N	(SD)	(SD)	
Treatment Group	High	18	3.33 (.55)	3.37 (.60)	
	Low	16	2.68 (.61)	2.61 (.70)	
	Low - MH	11	2.78 (.52)	2.52 (.69)	-.50
Total Group Means (SD)		45	2.96 (.63)	2.89 (.76)	

Table B2. Spring 1989 (Year 2), Play Ratings.

Categories			Pretest Means	Posttest Means	ES
Treatment Groups	Student Type	N	(SD)	(SD)	
Treatment Group	High	26	3.15 (.56)	3.00 (.58)	
	Low	41	2.97 (.64)	2.93 (.74)	
	Low - MH	24	2.98 (.64)	2.83 (.68)	-.23
Total Group Means (SD)		91	3.02 (.62)	2.92 (.68)	

Table B3. Spring 1988 (Year 1), Mathematics Self-Esteem.

Categories Treatment Groups	Student Type	N	Pretest Means (SD)	Posttest Means (SD)	ES
Treatment Group	High	18	.84 (.11)	.92 (.08)	
	Low	16	.79 (.16)	.84 (.09)	
	Low - MH	11	.77 (.11)	.78 (.14)	.11
Total Group Means (SD)		45	.80 (.13)	.86 (.11)	

Table B4. Spring 1988 (Year 1), Mathematics Self-Esteem (SDQ).

Categories Treatment Groups	Student Type	N	Pretest Means (SD)	Posttest Means (SD)	ES
Treatment Group	High	20	4.16 (.63)	4.25 (.90)	
	Low	34	3.34 (.99)	3.32 (.95)	
	Low - MH	22	3.25 (.86)	3.44 (.92)	.22
Total Group Means (SD)		76	3.53 (.94)	3.60 (1.00)	

Table B5. Spring 1988 (Year 1), Academic Feedback.

Categories					
Treatment Groups	Student Type	N	Pretest Means (SD)	Posttest Means (SD)	ES
Treatment Group	High	18	1.11 (1.28)	1.17 (1.28)	
	Low	15	.71 (.89)	.90 (1.00)	
	Low - MH	11	.52 (.69)	.98 (1.89)	.67
Total Group Means (SD)		44	.82 (1.04)	1.03 (1.35)	

Table B6. Spring 1989 (Year 2), Academic Feedback.

Categories					
Treatment Groups	Student Type	N	Pretest Means (SD)	Posttest Means (SD)	ES
Treatment Group	High	22	1.95 (1.50)	1.90 (.97)	
	Low	37	2.90 (2.10)	2.00 (1.31)	
	Low - MH	22	2.35 (1.87)	1.82 (1.36)	-.28
Total Group Means (SD)		81	2.50 (1.91)	1.92 (1.23)	

Table B7. Spring 1988 (Year 1), Percentage Correct on Fractions CRT.

Categories Treatment Groups	 Student Type	N	Pretest Means (SD)	Posttest Means (SD)	ES
	High	18	31.09 (19.22)	92.20 (8.21)	
Treatment Group	Low	16	13.71 (12.70)	75.44 (12.94)	
	Low - MH	11	4.15 (5.34)	45.61 (15.85)	7.76
Total Group Means (SD)		45	18.32 (18.13)	74.85 (21.84)	

Table B8. Spring 1989 (Year 2), Percentage Correct on Fractions CRT.

Categories Treatment Groups	 Student Type	N	Pretest Means (SD)	Posttest Means (SD)	ES
	High	26	23.62 (15.52)	89.58 (13.23)	
Treatment Group	Low	41	8.26 (9.86)	91.80 (17.41)	
	Low - MH	24	3.36 (3.54)	64.55 (17.64)	17.28
Total Group Means (SD)		91	11.36 (13.35)	74.40 (18.49)	

Table B9. Spring 1988 (Year 1), Mean Scores on Mathematics Subtest of SAT, Percentage Correct.

Categories					
Treatment Groups	Student Type	N	Pretest Means (SD)	Posttest Means (SD)	ES
Treatment Group	High	17	77.26 (9.25)	84.62 (8.16)	
	Low	13	34.02 (7.75)	43.49 (16.36)	
	Low - MH	11	33.74 (18.61)	31.99 (17.44)	-.09
Total Group Means (SD)		41	51.88 (24.63)	57.46 (27.17)	

Table B10. Spring 1989 (Year 2), Grade Equivalent Scores on Mathematics Subtest of Standardized Achievement Tests (ITBS & CTBS).

Categories					
Treatment Groups	Student Type	N	Pretest Means (SD)	Posttest Means (SD)	ES
Treatment Group	High	8	5.94 (1.40)	7.16 (1.42)	
	Low	30	4.22 (.66)	4.47 (.94)	
	Low - MH	17	3.81 (.52)	4.15 (.69)	.65
Total Group Means (SD)		55	4.34 (1.02)	4.76 (1.38)	

APPENDIX C

Follow-up Data

Table C1. Follow-up Mean Scores and Effect Size for each Instrument for Treatment Group Low-MH students only.

Year	Instrument	Posttest Mean	Follow-up Mean	ES
Year 1	Play Rating	2.63	2.59	-.08
	Positive Nominations	.11	.07	-.47
	Negative Nominations	.20	.19	-.15
	Self-Esteem	.79	.77	-.13
	CRT - Fractions	65.20	40.64	-1.96
Year 2	Play Ratings	2.48	2.77	.50
	Positive Nominations	.11	.12	.07
	Negative Nominations	.12	.16	.23
	Self-Esteem (SDQ)	3.74	3.58	-.16
	CRT	67.15	45.37	-5.60

APPENDIX D

Dissertation Abstract

ABSTRACT

The Effects of a Direct Instruction Program in Fractions on Academic and Mathematics Self-Concept

by

William H. Lowry, Doctor of Education

Utah State University, 1989

Major Professor: Dr. Ron Thorkildsen
Department: Instructional Technology

The study investigated the effect of a videodisc-based, teacher-controlled, direct instruction-based program in fractions content, on self-concept. Self-concept was operationally defined as scores on a slightly modified version of Marsh's Self-Description Questionnaire (Marsh, 1988). A quasi-experimental, nonequivalent control group design was used to compare the self-report self-concept of two groups of upper elementary students (N = 337). The treatment group (n = 171) received instruction in fractions via the teacher-directed, videodisc-based, Mastering Fractions program (Systems Impact, 1986a). The control group (n = 166) received their normal grade four or grade five mathematics program, but did not ~~include~~ study common fractions.

Differences in achievement scores provided support for previous findings regarding the Mastering Fractions

program. The treatment group covariance-adjusted mean on a criterion-referenced test was higher than that of the control (5.9 standard deviations). Differences in achievement test scores among the treatment classes varied directly with the levels of program implementation across classes.

The data were examined using both the student and the class as the unit of analysis. Using the student as the unit of analysis, the treatment group mathematics self-concept covariance-adjusted mean was 0.22 standard deviations above that of the control group. An analysis of raw gain scores yielded a standardized mean difference effect size between the treatment and control group scores of +.12. A statistically significant but small main effect was also noted across student pretest achievement levels. The posttest difference between low-achiever means treatment versus control students is slightly larger than the difference between high-achiever means. No statistically significant interaction was noted between student achievement level at pretest and treatment condition.

The class was also used as the unit of analysis. In this case the mean difference effect sizes between experimental groups were +0.86 (ANCOVA) and +0.34 (raw gain scores).

Differences were small to moderate, but consistent with the study hypotheses. Recommendations are presented

regarding future research and the use of direct instruction in school settings.

(197 pages)